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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. STUART BAKER, F.L.S., F.Z.S., M.B.O.U.

PART XIII.

With Plate XIII.

(*Continued from page 657 of Volume XXII.*)

Genus *PTEROCLURUS.*

The Genus *Pteroclurus* is, as I have already said, scarcely worthy of division from *Pterocles*, the only difference being that the central tail feathers of the former genus are produced in long filaments beyond the other rectrices, whilst those of the latter are normal.

There are altogether four species in this genus of which the first, *P. alchata*, is divided into two sub-species. Three species are found in India, of which one, *exustus*, is a permanent resident, one, *alchata* is, practically, if not wholly, migratory, and the third, *senegallus* very rarely breeds within Indian limits.

KEY TO THE SPECIES.

A. Lower plumage from breast pure white ... *alchata.*
B. Lower plumage marked with black.
  a^1. Middle of abdomen barred black and rufous ... ... *exustus.* ♀
  b^1. Middle of abdomen black.
    a^2. Black gorget across breast ... *exustus.* ♂
    b^2. No black gorget across breast ... *senegallus.*

Pteroclurus alchata.

(Sub-species—caudacuta.)

The Large Pin-tailed Sand-Grouse.

Tetrao alchata.—Linn. Syst. Nat. i, p. 276 (1766), xii, Edit.

Tetrao caudacutus.—S. G. Gmel Reise, iii, p. 93 (1774).

Pterocles alchata.—Blyth, Cat. B. As. Soc., p. 249; Jerdon, B. of Ind. iii, p. 500; Hume Str. Feath, i, p. 221; Blewitt, *ibid*, iii, p. 268; Hume, Cat. No. 801; Blanford, E. Persia, ii, p. 271; Hume, Str. Feath. vii, p. 161; Hume and Marsh. Game B. i, p. 77; Butler, Cat. B. of Sind, p. 53; Barnes, B. of Bom., p. 297; *id.* Str. Feath. ix, p. 458. Le Mess, Game-B., p. 58; Oates, Game B. i, p. 23; Bogle, Jour. B. N. H. S. xii, p. 529; Nurse, *ibid*, xiv, p. 388.

Pteroclurus alchata.—Ogilvie-Grant, Cat. B. M. xxii, p. 7; Blanford, Avi. India, iv, p. 58.

Pteroclidurus alchata.—Sharpe, Hand-l. i, p. 50; Oates, Cat. Eggs B. M. xi, p. 75.

Vernacular names.—None recorded.

Description, Adult male.—Centre of crown and nape grey, more or less tinged with ochreous, forehead, lores, sides of head rich rufous buff shading into ochreous on the neck all round. Chin and throat black and a narrow line of the same running from behind the eye nearly as far as the nape. On the back the ochre of the neck merges into olive ochre, a few of the feathers here and most of the scapulars with a yellow subterminal spot and all margined with grey; lower back and rump yellow buff barred with black, upper tail coverts even more yellow and the bars forming arrow heads on the longest. Tail barred blackish and buff at the base, becoming dark olive ochre at the tip and almost black on the prolonged portion, the outer tail feathers are tipped yellow and subtipped dark blackish. Lesser median and secondary coverts white with broad bands of bright chestnut chocolate near the tips and with black edges; shoulder of wing, bastard wing, primary coverts and primaries grey, the last named darker on the inner webs and margined white, the outer web of the first primary and all the shafts black; outer secondaries blackish brown, and bases white and edged with same; innermost secondaries like the scapulars; secondary coverts, where visible, yellow-ochre with blackish chocolate terminal bands. Breast pale pinkish rufous divided from the yellow ochre of the neck and the white of the lower breast and abdomen by narrow black bands; flanks axillaries, lesser and median under wing coverts, and under tail coverts white; under shoulder and edge of wing dark grey, greater under wing coverts pale grey.

When once fully adult the males do not vary much in tone of colouration but the number and size of the yellow spots on the

scapulars and adjoining parts do vary to a considerable degree and when these are unusually numerous they give a very bright boldly coloured appearance to these parts and, on the contrary, give a dull rather dark appearance when they are few and small.

Below, the rufous breast band varies a little in intensity and in the amount of pink, otherwise the lower parts are very constant.

Measurements.—Wing 7·98″ (213·6mm.) to 8·40″ (224·2mm.) with an average of 8·25″ (220·8mm.); tarsus 1·00″ to 1·12″ (25· to 28·5mm.) and averaging over 1·06″ (26·75mm.); bill at front ·50″ to ·58″ (12·5 to 14·6mm.) and averaging rather over ·53 (13·5mm.); the tail varies from about 5·50″ (140mm.) to 7·50″ (190·5 mm.).

These measurements are taken from a series of over a hundred skins, the very great majority of these being birds shot in India. They include the series in the British Museum and in the Tring Museum.

"*Males.*—14 to 15·5; expanse 24 to 26; 7·96 to 8·5; tail from vent 5 to 7; tarsus 1·0 to 1·13; weight 10 to 12 ozs." (Hume.)

"The feet are dirty or dusky green, in one specimen yellowish; the irides are brown; the bill varies in colour somewhat and I have recorded it in different specimens, as dusky green, greenish brown, brown, dark brown, slate colour." (Hume.)

Adult female.—Whole upper parts from forehead to tail buff barred black, on the shoulders and interscapulary region the tint is often somewhat rufous and that on the upper tail coverts brighter and more yellow. On the interscapulary feathers a few of the broadest bars of black have their centres grey. A short supercilium, lores and edge of forehead, sides of head and the neck rufous like those parts in the male but paler and duller; chin and throat white in the centre; a fairly well defined black line from behind the eye. Scapulars and innermost secondaries like the back, but the bars wider and bolder and with more grey and with the ends yellow ochre narrowly edge with black. Primaries and their coverts like those of the male. Secondary, greater and median coverts white with rufous subterminal bands and black edges, the bases, where covered, barred rufous and black; outer secondary covers and median primary coverts with broad white terminal bars edged black. Below the rufous of the fore neck there is a wide collar of black followed by a narrow fringe of the same colour as the neck, which merges into grey and is then followed by another narrow band of black. From this band the colours are as in the male, a broad band of rufous, a narrow band of black or very deep chocolate and the rest white.

The females, when adult, differ to much the same extent as the male underneath, but above the range of variations is considerably greater, some birds being much more boldly and richly marked than others and the amount of yellow markings and the extent to which

the slate grey bars take the place of the black on the scapulars and the dorsal region is variable.

Measurements.—Wing 7·65″ (184 mm. to 8·30″) (200·6 mm.) with an average of 7·99″ (196·3mm.); tarsus about ·97″ (24·5 mm.) and bill at front about ·49″ (12·6). The tail averages a good deal shorter than the male, the longest I have seen being 6·2″ (157·2) whilst many are well under 5·″ (127 mm.).

"*Females.*—Length 13·5 to 15; expanse 24 to 25; wings 7·5 to 8·15; tail from vent 3·75 to 6; tarsus 0·97 to 1·12. Weight 8·25 to 11·25 ozs." (Hume.)

The colours of the soft parts are the same as in the male.

Immature male.—In males not yet fully adult much of the barring of the upper parts as in the female is still retained, the head is wholly barred, the chin and throat white and the fore neck dull olive buff with large black spots. The black of the throat is acquired in patches, and finally the well marked crown, etc. of the adult male, though birds, otherwise fully adult, may be found with a few barred feathers on the upper head.

Plumage of young female.—Chin and throat white; whole upper surface barred buff and blackish; duller on the dorsal parts, brighter on rump and tail; wings with the white on the coverts replaced with grey, the slate grey bands replaced by black, and the whole tone duller and greyer. The sides of the head, neck and breast are dull earthy buff with bars of black, these bars are rather denser on the base of the throat and above the white of the abdomen, giving slight indications of the bands on these parts; the under tail coverts are white with a few brown bars and the rest of the under parts white as in the adult, but with obsolete brown bars here and there, especially in the centre of the abdomen.

First plumage of both male and female.—Whole upper parts, head, neck and breast dull buff, barred with blackish and brownish black above and dull brown below. Chin and throat white as in the older female. The bars on the head and lower parts are narrower and more numerous than in the older bird and are more crescentic in shape. The quills are paler and the inner primaries freckled with rufous towards the tip. The wing of the bird of this description measures 7·02″.

The nestling of this extremely common and widespread species does not, curiously enough, appear to have been yet described.

Mr. Meade Waldo was the first to discover that the male of this Sand-Grouse assumes a post nuptial plumage after the young are hatched, much in the same manner as many ducks do. He says "Roughly there is the first nestling plumage which is assumed from the down. This is moulted in the autumn into the winter plumage. In the very early spring this again is changed into the breeding plumage, and the cock in late summer puts on an eclipse

dress resembling the hen, except the slate blue bars on the back are missing. As far as I can ascertain these changes are brought about by a complete renewal of feather and all are complete, but the eclipse plumage is only perfect in adult and vigorous birds, otherwise the feathers that are first shed partake of the character of breeding plumage and eclipse and those last moulted of eclipse and winter plumage."

There are two sub-species of this Sand-Grouse which are very closely allied, *viz.*, those referred to in the Catalogue of Birds as *Pterocturus alchata* and *Pterocturus pyrenaica*, and before dealing with the distribution of these two forms, which will have to be considerably revised, it will be first necessary to dispose of the question of the names under which these two forms should be known.

The name *pyrenaica* was first given in 1760 by Brisson, to a bird from the Pyrenees, which in his " Ornithology" I, p. 195, he called *Bonasa pyrenaica*. Brisson's names are not, however, accepted in Ornithology unless adopted by Linnaeus, and in this particular case Linnaeus discards the name *pyrenaica* and renames the bird *alchata*.

This is in the 12th edition of his System Naturae, the first in which he mentions this species, though he refers to the genus *Bonasa* in the 10th edition. In the 12th edition he refers to this species as *Bonasa alchata* and states that its habitat is " Monspelir in Pyrenoeis, Syria, Arabia," the bird, therefore, is undoubtedly the same as that named *pyrenaica* by Brisson, which is the Spanish bird and Linnaeus merely adds Arabia and Syria to its habitat. Gessner, it should be noted (Avi. 311-307) describes his bird *alchata* as European, giving Italian, German and French names for it, he could not, therefore, have been referring either to Asiatic or African specimens, any more than Brisson did.

Under these circumstances the sub-species referred to as *pyrenaica* in the " Catalogue of Birds " cannot bear that name and will have to stand as *Pterocturus alchata alchata* (Linn.) and another name must be found for the Asiatic sub-species. The one having priority and, therefore applicable, seems to be *caudacutus* given by Gmelin, in 1774, to the form found in Southern Russia (S. G. Gmelin, Reisa, iii, p. 93, pl. xviii, 1774) for the South Russian bird is the same as that found in Asia Minor, Palestine, etc., and these again are the same as our Indian birds.

Accordingly, the two forms will stand as follows : *Pterocturus alchata alchata* for that sub-species found in Spain, etc. and *Pt. alchata caudacuta* (Gmelin) for the sub-species found in Asia, etc.

Russian ornithologists have divided this Sand Grouse into two further sub-species, naming the bird from South Persia, Afghanistan and Baluchistan (and of course India) *Pterocturus alchata*

bogdanowi and that from Northern Persia *Pt. a. severtzowi* but I cannot myself see that the birds from these areas vary in any way.

It would certainly be easy to select 10 birds from South Persia and adjoining countries, 10 others from Trans Caucasia and Trans Caspia, and yet 10 others from South Russia and shew each series to be quite separate; but it would then be equally easy to take 10 birds from each area and to shew in each series specimens of every type.

Distribution.—For a long time, possibly owing to the paucity of material available for comparison, it was considered that the form of this Sand-Grouse found in Northern Africa was the same as that found in South-Western Europe; but Whitaker, in his "Birds of Tunisia" pointed out that, strange to say, the bird in Northern Africa was not the same as his cousin just across the water in Southern West Europe, but was the same as that found to the East in Western Asia.

The British Museum has a magnificent series of both Asiatic and Spanish birds, but is very badly off for African specimens. This link is supplied by the collection in the Tring museum, where we have 7 specimens from Tunis and 2 from Morocco, with other specimens from Palestine, Lenkoran (Trans Caucasia), Merv (Trans Caspia), Bokhara and East Persia and South Russian Steppes.

These are all, obviously, the same sub-species and they are, equally obviously, different from birds taken in Spain and France, which are brighter above, owing to the large amount of yellow marking, and are also more richly and darkly coloured below.

The area of distribution of our Indian bird, therefore, extends from the North-West of India, through Baluchistan, Afghanistan and Persia, across the Caspian Sea and the Caucasus Mountains into the South Russian Steppes and throughout Eastern Asia Minor and again, due West through Southern Persia and Arabia into Northern Africa, through Abyssinia, Nubia, Egypt, the Sahara and as far West as Morocco.

The Spanish form, on the other hand, is confined to Portugal, Spain and France, where it is common, and straggles into Italy, Germany and Greece. Whether the bird which has been obtained in Cyprus and Malta belongs to the African or West European form there is nothing on record to shew.

I have seen but few French skins, but Paul Paris in his "Oiseaux de France" records that this is a common resident, nesting regularly in that country.

Within Indian limits the Large Pin-tailed Sand-Grouse occurs in enormous numbers in the North West and Sind in the Trans Indus country; in great numbers also, in the Punjab, between the Indus and the Chenab, after which it becomes less common towards the Gara and the Beas, though still constantly and regularly met with,

from here it extends throughout the Punjab, having been found in Ludhiana, and Delhi in the extreme East. To the South, Hume obtained it as far South as Sambhar in Rajputana, and I have notices of its occurrence from Jodhpur and Bikanir, and Major C. G. Nurse, in 1902, recorded it from Deesa still further South than it had been previously obtained. This last bird was shot by Captain L. Oldfield, R. F. A., who obtained one specimen out of a flock of 20 or 25 birds.

When in India it assembles in enormous flocks, literally in thousands, and in the more Eastern portion of its habitat this seems to be generally the case, indeed some people consider this Sand-Grouse to have been the Quail provided for the Israelites; further West, however, it does not seem to collect in nearly such large flocks.

Hume is the only writer who has given us an account of this bird's habits in India and his remarks are to the following effect. "I have seen very little of this species myself, and only on a vast plain some miles from Hoti Mardan, where during the winter, they were in tens of thousands. This plain is partly barren, partly fallow, and partly cultivated with wheat, mustard, and the like. It was only on the barren and fallow land that I saw them. They are extremely wary, and it was only by creeping up a nala or small ravine that it was possible to get within even a long shot at them. Their flight is extremely rapid and powerful, to me it seemed more so than of any of their congeners.

"They are very noisy birds, and whether seated or flying, continually utter their peculiar cry, which, though somewhat of the same character as that of *arenarius*, is unmistakably distinct from the call note of any of the other species.

"Those I shot, and, according to their account, most of the large series previously shot by my collectors, had fed entirely on green leaves, seeds, small pulse, and grain of different kinds. The gizzards contained quantities of small stones. There were several pools and places where the rain floods had not quite dried up, on the plain I have referred to, and the birds seemed to sit about much in their immediate neighbourhood.

"One or two of my birds were very fat, so much so that it was difficult to skin them, but as a rule, when cooked they were as dry and tasteless as the rest of the Sand-Grouse.

"I was told that they were occasionally hawked with Shaheens, but their flight is so rapid and powerful that I should doubt much sport being obtained this way. I was also told that they could be shot by working a couple of Peregrines over them, when they allow a very close approach and almost refuse to rise."

This account agrees well with Whitaker's account of these birds in Tunis as seen by him at one of their favourite watering places.

He says "In many of its habits the Pin-tailed Sand-Grouse resembles the preceding species (*P. arenarius*) though differing in others. It is, as a rule, found in much larger flocks than *P. arenarius* and is said never to approach the sea-coast. Like that bird, however, it is very wild and shy and when disturbed, generally flies for a great distance before settling down again, although should it be its hour for drinking, and its thirst not yet be appeased, it will often make one or two attempts to return to the water before finally leaving the spot.

"Such of the *Oueds* as may still have some water in them in spring, or even the holes scooped out of the river beds by the Arabs for the purpose of providing themselves and their flocks with water are sure to be visited by Sand-Grouse for drinking, and it was once my good fortune to see no less than three alternative species of these birds frequenting one of these spots at the same time, and to witness flock after flock of each come down to the water during the hour or two the flight lasted.

"*P. arenarius* and *P. alchata* were well represented on this occasion and about equally numerous, as shewn by specimens obtained of both, but a third species was also present, of which I failed to secure an example, but which judging from its appearance, on the wing, appeared to be *P. coronatus*.

"The morning flight of Sand-Grouse for the purpose of drinking commences soon after sunrise, and is generally continued for an hour or two, or until the sun is well up when it entirely ceases. During the time the flight lasts the spot visited by the birds, particularly should it be one where water is abundant, presents a most animated scene, the air being full of small flocks hurrying to and from and the sandy banks, and the sandy parts of the river bed being in some places thickly covered with them, while the chorus formed of many hundreds of clamourous bird voices creates quite a babel of sound.

"The food of this species consists chiefly of the seeds and tender parts of various desert plants. Its note is a ringing *catarr* or *quettarr*."

In the Zoologist of 1896, p. 299, and the "Field" of August 1896 Mr. Meade Waldo first gave an account of the breeding of *Pterocles alchata* in confinement and described how the male, after the young were hatched, would "rub the breast violently up and down on the ground, a motion quite distinct from dusting, and when all awry would get into his drinking water and saturate the feathers of his under parts. When soaked he would go through the motions of flying away, nodding his head, etc. Then, remembering his family was close by, would run up to the hen, make a demonstration, when the young would run out, get under him and suck the water from his breast."

In a longer account in the Avicultural Magazine for 1906, p. 219, Mr. Meade Waldo gave yet further details of this curious habit, as well as other most interesting details. He writes "Incubation lasts from twenty-one to twenty-three days: the hen sits by day, the cock taking her place by night, usually going on the eggs about 5 p. m.; three eggs are a full clutch. The young when hatched quickly become independent, and about the 10th day separate at night, roosting away from their parents, and as far as possible from each other, not settling down to their final roosting place until it is almost dark. Both parents brood the young when they are very small."

"The extraordinary method employed by the parent male Sand-Grouse of conveying water to their young by saturating the feathers of their breasts, was first described by me in 1896, and since by Mr. St. Quentin in his interesting account of the successful rearing of the Lesser Pin-tailed Sand-Grouse, *P. exustus*. I have had the good fortune to see the males of *Pterocles arenarius*, the Black-breasted Sand-Grouse and *Pteroclurus alchata*, the Greater Pin-tailed Sand-Grouse getting water for their young in a wild state, but, had I not seen it administered in confinement, would have considered them to have been demented birds trying to dust in mud and water, when unlimited dusting ground surrounded them on every side.

"In very waterless districts, where the only water procurable was from deep wells situated at great distances from one another, this method of procuring water must be most precarious, for I saw *P. arenarius* waiting by the wells and going to the muddy spot where the skins used to be laid before being loaded on to the camels, and where the water was slopped over from the troughs where the animals drank. I also saw them fly over the prickly Zareba surrounding the tent-villages and go to where there was a soft spot for the same purpose. I did "(not?)" see *P. alchatus* actually soaking themselves, they were much wilder, and also in less arid places, but I repeatedly saw cocks pass over, their white breasts soaked in mud and water."

A further interesting note in the Avicultural Magazine for February 1910 by the same writer describes how he kept a female bird of this species in confinement for 17 years, so that she must have been at least 18 years old at the time of her death. She bred regularly year after year from 1893 to 1906, and generally succeeded in bringing up her young. Mr. Meade Waldo tells us that with other food, he gave her as much hemp seed and maw seed as she liked, and that the latter was her favourite seed.

Pteroclurus alchata does not regularly breed with us in India, though it has done so on rare occasions and may, quite possibly, be often found to do so; otherwise it breeds in suitable localities throughout its range.

The first egg of this species taken in India is one now in the British Museum, which was found at Jhimpir in Sind on the 10th July, 1878. After this, nothing else was recorded until Mr. Bogle wrote the following interesting note to the B. N. H. S. Journal, which I quote in extenso, merely noting that it was written from Mardan in the Punjab. "I cannot see, either in Oates, Jerdon, or Hume and Marshall any record of the Eastern Pin-tailed Sand-Grouse, *Pterocles alchatus* breeding in India, which I think I may claim to have proved breeds in the Peshawar Valley. Two days ago, eggs were brought to me by a man, who declared one was that of the Common and the other that of the Pin-tailed Sand-Grouse. Doubting his word I made arrangements to go out this morning, 10th June 1900, with him, and see if I could gather any information myself. I first went to the place where these Sand-Grouse water, where I found, close to a small village called "Kasim" the Common Sand-Grouse flighting in packs and a very few pairs, while to my surprise the Pin-tails all came in pairs (I saw five or six pairs). I shot one pair of the latter and then proceeded to search a few miles further on in a vast open plain for nests. I found only two nests, each containing three eggs of the Common Sand-Grouse. In each case I approached so close to the bird in the nest that there was no necessity to shoot it in order to identify it. On my return I dissected the female Pin-tailed Sand-Grouse and found an egg inside quite ready for laying, and I have no doubt that it would have been laid to-day in the same plain I was searching in had the bird lived."

"I regret to say the egg was broken badly, first pierced by shot and again broken in extraction."

According to Canon Tristram, writing of this bird's habits in North Africa. "Its breeding habits are exactly like those of *P. arenarius*, but its egg is of a much richer fawn coloured tint, covered and sometimes zoned, with large maroon red blotches, while that of the other is of a paler hue, with obsolete pale brown blotches."

Salvin describes these birds as breeding in the Atlas, and says "The extensive sandy plains termed the Harakta, of which El. Korarf is one of the largest, are the only localities in which we met with the Sand-Grouse. It makes no nest but scrapes a slight hollow in the sand, in which it deposits its three eggs. These are laid in May, the young being hatched about the second week in June."

The eggs of this Sand-Grouse and of the other sub-species *Pt. alchata typica* differ from all other Sand-Grouse eggs in the richness of their colouration. Normally the ground colour is a rich clear buff, though in a few eggs it is a paler and more cream or bright stone-yellow in colour. The superior markings consist of well defined blotches and spots with a few specks of rich vandyke brown, here and there being one or two with a chocolate or deep maroon tint,

the secondary are similar in size and shape, but are lavender grey and neutral tint in colour, some quite dark.

The surface is fine and smooth with a strong gloss and the shape is the normal elliptical one of all Sand-Grouse. They vary very greatly in size, more so I think than the eggs of any other Sand-Grouse do. The eggs recorded in the British Museum Catalogue taken from Northern Africa and included under the species *Pteroclidurus* belong, as I have already said, to the Indian form. These eggs vary from 1·65″ to 1·96″ in length and from 1·15″ to 1·3″ in breadth. I have no egg which does not come between the extremes of length given here, but I have one which is only 1·11″ (28·3 mm.) in breadth. The average of 28 eggs in my collection is 1·83″ × 1·18″ (26·5 × 30·0 mm.).

Pteroclurus exustus.

The Common Sand-Grouse.

Pterocles exustus.—Temm. Pl. Col. v, Nos. 354 and 360 (1825); Blyth. Cat. B. As. Soc., p. 249; Gould, B. of Asia, vi; Jerdon, B. of Ind. iii, p. 502; Blanford, Geol. and Faun. Abyss, p. 419; *id.* J. A. S. B., xxxviii, pt. ii, p. 189; McMaster, *ibid*, xl., pt. ii, p. 214; Stoliczka, *ibid*, xli, pt. ii, p. 249; Hume, Str. Feath. i, p. 225; Adam, *ibid*, p. 392; Hume, Nests and Eggs, p. 513; King, Str. Feath. ii, p. 458; Butler, *ibid*, iv., p. 4; Fairbank, *ibid*, p. 262; Hume and Marsh., Game-B. i, p. 69; Hume, Str. Feath. vii, p. 161, Ball, *ibid*, p. 225; Doig, *ibid*, viii, p. 371; Mc Inroy, *ibid*, p. 492; Hume, Cat., No. 802; Butler, Cat. B. of Sind, etc., p. 53; *id.* Cat. B. S. Bombay, p. 67; *id*, Str. Feath. ix, p. 421; Reid, *ibid*, x, p. 61; Davidson, *ibid*, p. 316; Barnes, B. of Bombay, p. 300; *id.* Jour. B. N. H. Soc. i., p. 55; *id. ibid*, v., p. 336; Oates, Humes Nests and Eggs, 2nd Edit., p. 361; Newnham, Jour. B. N. H. Soc. vi, p. 94; Nurse, *ibid*, xiv, p. 172.

Pteroclurus exustus.—Ball, Str. Feath. ii, p. 426; Ogilvie-Grant, Cat. B. M., xxii, p. 12; Oates, Game B. of Ind. i., p. 26; Blanford, Avifauna, Ind., iv., p. 60; Ogilvie-Grant, Game-B. i., p. 12; Le Mess., Game-B., 4th Edit., p. 58.

Pterocidurus exustus.—Sharpe, Hand-Bl. i, p. 50; Oates, Cat. Eggs, B. M. I, p. 77.

Vernacular names.—Bhat-titur, Bakht-titur, Kumar-tit Kakar, Dangar Rowrie (H.); Butabur, Batibun (*Sind*); Popandi (*Bhil*); Pakorade (Mahr); Jam polanka (Tel); Kal-Gorjal-Haki; (*Can. Mysore*); Kal-handari (Tamil.)

Description, Adult male.—Crown to rump and upper tail coverts isabelline-grey to isabelline-brown, generally darkest on the tail coverts and palest on the crown; lores, cheeks, chin and throat dull yellow ochre, often tinged with orange buff, this colour extending

round to the back of the nape forming an indistinct collar, which shades off into the other parts. Scapulars and sometimes the feathers of the inter-scapulary region the same as the rest of the back but darker and changing into ochreous-buff, or buff, at the ends which are margined with brown at the tips. Inner lesser coverts like the back gradually changing to buff, or ochreous, on the other lesser, median and inner greater coverts which are margined with brown; greater secondary coverts and inner secondaries buff, or ochreous-buff, the latter shaded with olive on the inner web and inside of the outer web. Edge of shoulder of wing, bastard wing, primary coverts and primaries dark brown, the five inner primaries with broad oblique bands of white at the end; outer secondaries brown.

The yellow ochre of the throat and fore-neck changes into vinous buff on the upper breast which is divided from the lower breast by a narrow band of black, above which is an indefinite and still more narrow band of white, caused by the white of the black tipped feather showing through; lower breast dull yellow-buff changing gradually into the chocolate of the rest of the lower plumage and flanks, which itself becomes black in the centre of the abdomen; feathers of the tarsus and under tail-coverts creamy buff; Central tail feathers like the back darkening towards the narrow prolonged portions which are quite black at the ends, the other rectrices are tipped with pale buff and the outermost also mottled with dark rufous next this pale tip.

On the upper plumage the colour shows most variations on the wings where it runs from a beautiful pale vinous buff of cream dove colour, to a bright chrome yellow. In the great majority of birds the general tone is a vinaceous buff, with sandy yellow predominating on the softer feathers of the wing.

The amount of black on the abdomen also differs greatly in different individuals but African birds, on an average, seem darker and more richly coloured here than are Indian specimens.

The yellow of the throat varies from pale, rather dull chrome yellow, to a bright almost deep chrome.

"In this species the males average rather larger and heavier and have decidedly longer tails. The following is a resumè of many measurements accorded in the flesh:—

"*Males.*—Length 11·75 to 13·75; expanse 21·13 to 22·5; wing 6·7 to 7·5; tail from vent 4·38 to 5·87; tarsus 0·9 to 1·0; bill from gape ·62 to ·7 per cent. Weight 8 to nearly 10 ozs." (Hume.)

To the above I may add a few average measurements taken from the *made up skins* of over 100 specimens. Wing 7·15" (190 mm.); bill at front, from tip to feathers on forehead ·52" (13·6 mm.).

Colours of soft parts.—"The feet and bill vary from pale slaty grey to pale plumbeous, or lavender blue; the irides are dark brown and

the orbital skin pale lemon yellow to pale yellowish green." (Hume).

Adult female.—Whole of upper plumage rather dull buff, sometimes sandy buff, sometime vinaceous and sometimes with here and there a slightly rufescent tinge; the feathers of the crown and nape are marked with central longitudinal spots of dark brown which form regular streaks, on the hind neck, the spots widen into blotches and on the upper back become broad bars, the centre wider and pointed; the feathers of the rest of the upper parts are barred; scapulars, innermost secondaries and lesser and median coverts like the back but the feathers broadly tipped with buff and some of the coverts very finely edged with reddish brown; remainder of wing like the male but with fewer reddish bars on the median coverts. Chin, lores, supercilia, sides of the head and throat yellow ochre, the sides of the head speckled with blackish brown, these spots increasing in size on the neck and breast which is like the back, but generally with a stronger vinaceous tint; the chin and throat are immaculate in old birds, but the ear coverts have fine black hair marks. Most females have a faint indication of a very dark brown line separating the upper breast from the lower, which is a dull pale ochre-buff; abdomen, flanks and feathers of vent rufous buff closely barred with very dark brown, under tail coverts creamy buff. Tail feathers like those of the male; axillaries and under aspect of wing brown, the smaller coverts and shoulder barred with dull buff.

As already shewn above the birds grade in general tone from a sandy buff to a dull vinaceous buff above and on the under plumage they vary to much the same extent. The upper breast may be quite a dull, almost brown tint, whilst other birds are here quite a pale sandy buff; most birds will, however, be found intermediate. The light unspotted lower breast also varies in some degree, though not as much, I think, as the upper breast, and the abdomen and flanks also go through the same gradations of colours; but Western birds appear to be invariably darker than our Indian birds on these parts, although they seem no more richly coloured above. The colour of the throat and chin varies from very pale cream yellow to quite a rich, though light, chrome yellow."

"*Females.*—Length 11 to 12·25; expanse 20·9 to 21·5; wing 6·6 to 6·9; tail from vent 4·0 to 4·8; tarsus 0·8 to 0·85; tail from gape 0·6 to 0·67; weight 7·5 to 8·3 ozs." (Hume.)

The average wing measurements of about 100 females is 6·85″ (182·5 mm.) The extremes of length were, however, far greater than in Hume's series, ranging from 6·35″ to 7.05″ (170·5 to 187·5 mm.).

The colours of the soft parts are the same as in the male.

An immature female differs from the adult in having the outer primaries and inner secondaries tipped with buff, the former

vermiculated with black, the upper breast spotted with blackish brown, the centre pair of tail feathers not produced with filaments." (Ogilvie-Grant.)

A young bird with points of fluff still about it, has the whole of the upper parts a pale dull buff and is finely vermiculated all over with tiny wavy bars of black, many of the feathers having the ends edged with white and with a chestnut patch at the tip. From chin to breast the colour is an earthy buff with fine bars of blackish and the abdomen and flanks are dull black. The quills are blackish brown, the trips freckled with buff and black, and the inner secondaries freckled thus all over; the greater and median primary coverts are also black, the former very narrowly, the latter broadly edged with dark buff.

Another specimen older than the last and with all the nestling fluff worn off is the same, but has a wide band below the breast and above the black abdomen almost devoid of spots and the breast instead of being vermiculated with narrow black bars has definite black spots; the inner secondaries are also more clearly and regularly barred with dull buff and deep brown, though the tips retain the same chestnut and black freckling. The tail is throughout banded earthy buff and black.

Nestling in down.—This is yet another of our common Indian Game Birds, the nestling of which still remains to be described.

Distribution.—Pteroclurus exustus extends throughout North West Africa and South-East Asia into India. In Africa it is common, in South Egypt, Nubia, Abyssinia, and extends into Somali, North Egypt and West as far as Algeria and South into British and German East Africa. East it works through Arabia from the extreme South to the extreme North through Palestine and Arabia Petroid, South Persia into India.

Within India it occurs practically over the whole continent in suitable places and Hume thus defines its habitat. "Throughout India proper, where the rainfall is moderate, the soil fairly dry and the country open and tolerably level, the Common Sand-Grouse abounds. Towards the East and South its general distribution is much that of the Painted Sand Grouse, though the particular localities it affects are different; but it is a Western form which extends into India and not a purely Indian form, and it is common in places (for instance in Sind) to which P. *fasciatus* does not extend.

"It is a bird of the level, sparsely wooded, sandy countries *par excellence*, and though it may be shot in sundry plains *close* to hills in Rajputana, unlike the Painted Sand-Grouse, it eschews Hills, has no liking for scrub, and absolutely avoids damp, swampy, low-lying tracts, jungles and forests.

"Bearing this in mind, it may be said that it occurs in all suitable

localities throughout the Punjab, Sind, Rajputana, the N. W. Provinces and Oudh, the Western parts of Behar and Chota Nagpore, the Central Provinces and the Central India Agency, including Bundelkhand, Berar, the Nizam's Territory, the whole Bombay Presidency, except the Sub-ghat littoral, Mysore and the Northern and Central portions of the Madras Presidency."

Blanford records that he has seen this Sand-Grouse at Raneegange and I have seen it in the same district of Bhirbhom, Dr. King saw one in the Botanical Gardens, Calcutta (probably an escaped bird), and Blanford again shot some a little to the North of the Cauvery, near Trichinopoly. It does not extend to Ceylon but it is found in Travancore, whence I have received eggs.

Col. Faithful, in epistola, says "about 3 or 4 years ago I came across a flock of about six of the small kind of Sand-Grouse on the Karewa at the back of Ardwin in the Phupiyan direction, these and the one I shot are the only ones I have ever shot in Kashmir. The one I shot was got in the early part of February."

Jerdon gives a most interesting account of this Sand-Grouse and its habits. He remarks "This is the most common and abundant species of Sand-Grouse throughout India, being found in every part of the country, except the more wooded portions, and never occurring in forest districts.

"This Sand-Grouse frequents the bare open plains, whether rocky or otherwise, and is very partial to ploughed lands and bare fallow fields. It feeds chiefly in the morning and between 8 and 9 a. m., goes to drink at some river or tank, at which, in some parts of the country, thousands assemble, and they may be seen winging their way in larger or smaller parties from all quarters, at a great height, uttering their peculiar loud piercing call, which announces their vicinity to the sportsman long before he has seen them. They remain a few minutes at the waters edge, walking about and picking up fragments of sand or gravel, and then fly off as they came. In the hot weather, at all events if not at all seasons, they drink again about 4 p. m. When they are seated on bare sandy or rocky ground, they are most difficult to observe, from the similarity of their colour to the ground; sometimes they can be approached with care near enough to get a good shot, at other times, especially if in large flocks, they are shy and wary. A small flock or single bird can often be approached very close by walking rapidly, not straight, but gradually edging towards them; and, in this way I have often walked up to within two or three yards of them. They feed on various hard seeds, especially on those of various *Abysicarji*, *Desmodium*, etc., as well as on grass, seeds and grain."

"The bird, if kept long enough, is very excellent eating, though the flesh is somewhat hard and tough, but with a high game

flavour; and the young birds when nearly full grown, are excellent."

This species of Sand-Grouse in India is not migratory though it may move about to some slight extent under pressure of climatic conditions and during the height of the extreme dry season may wander into districts it does not visit at other times.

Its drinking hour depends on the season and it often does not drink in the cold weather until nearly 10 o'clock, whereas in May and June it will be found watering as early as 7 a.m. Roughly speaking, it appears to feed for some two hours after the sun is up after which it drinks before settling down for a siesta during the hotter hours of the day. In the evening it often does not drink at all, but during the hot weather thirst generally compels it to drink again before its evening feeding hour and it will then be found at water between 3·30 and 4·30 or a little later. It is not crepuscular in its habits like *Pterocles fasciatus* and *coronatus*.

Its food appears to be entirely vegetarian and even as such confined mainly to hard seeds and grain; in two instances only did Hume find insects in their stomach and I can find no other records referring to this diet. They do sometimes resort to cultivated fields for grain and seed, but for the greater part they keep to the uncultivated plains and it is wonderful the way they manage, not only to obtain enough food to sustain their great vitality but actually to keep them plump and in the highest condition.

They are not as a rule found in enormous flocks such as those of *Pteroclurus alchata* and *Pterocles arenarius* and flocks of over 100 are exceptional, though some few of 200 or even more have been seen. Generally the flocks number 20 or 30 to 50 and these come down to water in independent packs, not collecting together for the purpose. Arrived at the water they settle at once, unless alarmed, a short distance from the water and there, like all Sand-Grouse, squat for a few seconds or minutes, before running down to the water edge for their drink. After this they remain a short time and walk about and scatter a good deal, but do not seem to quarrel with one another as so many other Sand-Grouse do, and then all fly off again to their resting place.

Hume says that whereas in the day time when feeding they scatter widely over the ground but that during the night when sleeping they collect in a very compact mass; he also adds "and during the night they must keep better watch than during the day, for often when crossing the huge Oosur plains in Etawah after dark, at times after mid-night, I have heard flocks of them rise at considerable distance from me. Moreover, I have never found any of their feathers about in the morning, as I have of so many ground roosting birds, shewing where a jackal or a fox has made a lucky hit. If one remembers how abundant this species is in many districts and how superabundant in the same places,

foxes, jackals and wild cats and also that the Sand-Grouse leaves a strong scent by which a dog will nose out a wounded bird hidden amongst the clods of a ploughed field in a moment, it does speak well for *their* chowkidars that none of these little Sand-Grouse ever seem to fall victims to these midnight marauders.

"Still native fowlers will at times surprise them, and during dark nights, in some fashion, creep up and drop a net over the entire party. The net used is a very light one, a truncated triangle about 8 ft. wide at bottom, 4 ft. at top, and about 4 ft. wide, attached to two light slender bamboos, each about 8 ft. long. The covey is marked as it goes to roost, and then the man about 11 o'clock (the night must be dark, and is all the better for being windy) steals up and drops the net over the whole pack. I went out several nights to try and be present at a capture, but on only one occasion were any caught, and then only two, but a few nights after, the men who were *akerias*, and who were still in my camp, snaring ducks and quails, brought in some forty, that they professed to have caught in this way in one haul, and they were polite enough to hint that it was the bad smell of an European that had foiled their efforts on previous occasions. They were doubtless humbugging in some way but one thing is certain, they do constantly manage to catch whole packs in some way or other during dark nights, and are therefore, though they certainly do not *look* so, considerably sharper than the beasts of the field."

The only way of making a big bag of Sand-grouse is to wait for them at their drinking place, but in this way very big bags indeed can be made, especially when arrangements are made to prevent the birds watering at any other pieces of water within a radius of some miles, as is done sometimes when 'big wigs' have to be provided with sport.

During the non-breeding season shooting over water is legitimate enough for the Common Sand Grouse are strong and good fliers, fly high and take a lot of hitting before they drop. They must, however, be given a rest during the principal breeding season, if this can be defined, and, where it cannot, then the normal season must be allowed them, and the birds forced to adapt themselves to it.

When thirsty they must drink and it takes a lot of shooting to drive them away even temporarily, but Hume mentions a case in the Sirsa district in which the cruel sport was practised by two guns down at the water's edge, and a great number killed and during the next week a large number of eggs were found deserted and destroyed (I suppose by crows and mongooses) in what was known to be a favourite breeding place two or three miles from the tank."

From the above it is plain that these birds can be driven right out of a district by too much prosecution at their drinking places, a fact which should be carefully borne in mind by sportsmen.

Fortunately this Sand-Grouse does not seem to be decreasing in India, bags are made as big now as were made 50 years ago and the flocks seem to be as big and as numerous as ever they were in Hume's time. It is not so long ago that Major Nurse wrote as follows "The Common Sand-Grouse (*Pterocles exustus*) has been unusually abundant at Deesa this year. I feel sure they must have increased in numbers since I first came here, now nearly five years ago. Possibly the last few years, which have been unusually dry, have been especially favourable to their increase. A few weeks ago over 400 were shot over a running stream one morning by a party of 7 or 8 guns, and this at a place where more than 200 birds had been killed on several previous occasions during the course of a few weeks."

Here and there a sportsmen writes to say that he thinks the birds have decreased in numbers, but where this is the case the decrease is generally found to correspond with an increase in cultivation or irrigation and where their haunts have been left untouched there the birds seem to be much as they were in Hume's time.

The Common Sand-Grouse breeds everywhere within its range in India, more freely in some parts than in others according to whether the wide stretches of waste lands it loves and requires are obtainable or not.

The Common Sand-Grouse is an easy bird to domesticate and is often kept by natives and has also been successfully kept by Europeans. Mr. C. Barnby Smith has the following interesting notes on this bird in captivity in the August 1910 number of the Avicultural Magazine "A friend very kindly sent me over three Indian Painted Sand-Grouse (*Pterocles fasciatus*) caught near Bhopal in Central India. The birds (a cock and two hens) arrived in good health in the early part of last February. At the same time a consignment of the Common Pintail Sand-Grouse (*P. exustus*) arrived. These birds seem to travel well, as out of eighteen birds that left Calcutta sixteen arrived alive.

"Such of the Pin-tailed Sand-Grouse as I retained for myself I put at first with the Painted Sand-Grouse in the conventional sort of place—a large wooden shed (with sand floor) open on the South, on which side it has a sort of glass verandah with grass on the ground underneath.

"The birds were, and are, fed on millet, canary, maw, rape and hemp seeds, but seem to like millet best of all. They are also supplied with lime, small flint, grit and rock salt.

"The Pin-tailed Sand-Grouse do not seem to care for grass at all but love to squat in the sand, basking in the sun whenever possible. The greatest danger with these birds seems to be their sudden panics, which makes them dash violently against the sides of the enclosures unless the feathers of one wing are heavily cut. My birds arrived late at night (as birds always seem to do) and when I

went to look at them the following morning the whole lot were dashing with wild flights and shrieks of terror in all directions. It was only prompt and resolute action with a landing net and subsequently with a pair of scissors that put a stop to their apparently determined efforts at suicide.

"The Pin-tailed Sand-Grouse soon become comparatively tame and run about on the sand with contented little "crooning" cries. I have noticed they are much steadier when divided as, when a lot are together, the alarm note of one at once sets off the others attempting to fly. So far I have seen no signs of nesting, though I have divided them into several different enclosures in hopes they will do so."

What constitutes the breeding season of the Common Sand-Grouse is, it must be admitted, practically impossible to determine and the utmost one can say is that more breed in some months than in others and even thus we must hedge and allow that what are the favourite months in one place need not be so in another place no great distance away. For instance, if we take the three places Sirsa, Hissar, and Hansi, all close together in the South of the Punjab, we find that the British Museum has a series of no less than 75 eggs from round about these towns which were taken in the following months:—

March	...	...	9
April	...	...	23
May	..	...	6
June	...	...	5
July	...	...	9
August	...	...	0
September	...	...	8

and 35 are not dated. This does not help us much but would seem to infer that they do not lay in the cold weather. If we then turn to Hume's "Nests and Eggs" we find Khan Nizam-oo-deen, Khan Bahadur, took eggs at or near Sirsa on the following dates:—

1869	1870
January	.....
February	3rd, 24th.
March	1st, 4th, 12th, 21st.
April	21st, 22nd, 27th, 28th.
May 8th & 25th.	1st, 3rd, 5th, 7th, 15th, 28th,
June 16th, 17th, 30th.	11th, 15th, 21st, 30th.
July 1st, 2nd, 5th, 10th, 11th, 12th.	23rd.
August	.....
September 1st, 2nd, 3rd, 7th, 10th	.....
October	3rd, 22nd.
November	24th.
December	7th, 20th.

Here we have eggs in every month but January and August, but the favourite months may be said to be March to July. In confirmation of this, Mr. R. M. Adam says that about the Sambhar Lake they breed in great numbers in April and May. Mr. J. Davidson took these eggs from January to June in the Deccan and Major Cock found them breeding at Nowshera in May and June, whilst Mr. A. Anderson says that in the Doab they breed in March, April and May and finally Col. Butler found their eggs at Dungarwar (55 miles South of Deesa) in March and May. On the other hand Davidson found them breeding in Western Khandesh in February, in the same month Col. Butler found their eggs in Belgaum and Mr. Hastings took their eggs in October in Etawah, S. W. United Provinces.

Col. Bingham wrote to me that he took their eggs near Mhow in January and Mr. E. G. Phythean Adams also wrote to me to the effect that he found them laying round about Poona in December, January and February.

The only conclusion one can draw is that these birds breed more or less throughout the year but that in North and Central India more breed from March to July than in other months, whilst further South they breed earlier, the majority in February and March. It is probable also that most birds lay twice in the year at least.

The eggs are laid in a depression in the soil, either natural or scratched out by the birds themselves. In the very great majority of cases there is no lining of any sort whatsoever, but Adams, Anderson and one or two other observers have found a certain amount of grass placed in the hollow as a sort of rough lining. How rare, however, it is to find such, is shown by the fact that in the enormous number of nesting places found by Hume, Davidson and the Khan Bahadur, never once did any of them ever find any lining placed in the depression below the eggs.

Three is the number of eggs almost invariably laid, but occasionally two only are incubated. The stories, however, of five and four eggs being laid by the same bird are almost certainly the result of two birds laying in the same nest-hole or of some mistake on the part of the collector. Both birds take part in incubation, and as the eggs are laid in great open plains, generally with no scrub, grass or stone to shield them from the sun, the birds have to cover the eggs in the heat of the day to prevent them being killed, if not cooked by the sun. Now and then the birds may take advantage of the cover afforded by a tuft of grass or small bush, or she may lay her eggs in amongst stones which partially shield them from the sun, but she never makes her nest-hole in among bushes and jungle as does *Pterocles fasciatus*. Hume says the haunts it loves best as breeding sites are scattered stubble or fallow, or newly ploughed fields rather than the large semi-desert plains surrounding them.

Mr. A. Anderson found them breeding in a curious place "a plain covered from miles with *reh* (a saline effervescence) which gave the ground the appearance of being carpeted with thick snow" on this ground he flushed a Sand-Grouse from a pair of eggs and he goes on to note "my camp being close to this place, I amused myself in watching the birds incubating, feeding, round about their nest and dusting themselves after the fashion of fowls. On the 4th as I approached the nest, the bird glided off, and skulked away in a crouching position, so as to avoid detection and then squatted."

Incubation appears in India to extend over 16 or 17 days but may vary more than this according to the time of year in which they are laid. Mr. Meade Waldo who has been successful in rearing these birds in captivity reports (Avicultural Magazine, March 1913), that eggs layed in April were not hatched until the 23rd day, whereas others laid in July were hatched in 18-19 days.

In this article Mr. Meade Waldo writes "The procedure of these birds is precisely the same as the Greater Pintailed Sand-Grouse (*Pterocles alchata*), *viz.*, the female incubates by day, the male by night, and the male soaks his breast with water for the young to drink or rather suck."

As regards their eggs I have but a poor series and can add nothing to what Hume has recorded in "Game Birds." Here he describes them as follows:

"The eggs, like those of all other Sand-Grouse, are long and cylindrical, like those of a Night Jar. The texture is fine and smooth and they have generally a fine gloss. Not only in shape, but in marking also, do many of them strongly resemble those of some species of Night Jar. The ground colour varies much; in some it is a pale, somewhat pinkish stone colour, in others greyish or dingy or greenish white; in some pale *cafe-au-lait*, in others a somewhat light olive brown. Typically they are thickly spotted, streaked or irregularly blotched, pretty uniformly over the whole surface with two sets of markings, the one of darker or lighter shades of olive brown, the other a sort of pale inky purple, and these latter, which are most commonly streaks and clouds, seem to underline the others. Different eggs vary much in the distribution, size and intensity of these markings, as also in the relative proportion of the extent of surface covered respectively with what I may call the primary and secondary markings; in some almost the whole ground colour not occupied by the primary markings is clouded with the pale inky purple, in others only here and there a few spots of this colour are traceable; in some all the markings are small, very thickly set and freckled, in others they are bold, large, eccentrically shaped blotches, comparatively thinly distributed over the surface. Some of the eggs are, as a whole, very much darker coloured than others, and in some the ground colour might perhaps be best

described as a faintly greenish-grey. As a rule the paler the ground, the paler the markings, and *vice versa.* Exceptionally beautiful marbled eggs are met with, as also unmottled pale creamy varieties.

I have never, however, seen one that could be taken for an egg of *fasciatus.*"

"The eggs vary in length from 1·32" to 1·6" and in breadth from 0·93" to 1·11"; but the average of 70 eggs is 1·45" by 1·03"."

Reducing Hume's figures to millimetres we get respectively 33·6 to 40·5, 23·2 to 28·2 and 36·8 × 26·2 mm.

Oates gave the measurements of the eggs in the British Museum as running up to 1·15" (29·2 mm) in breadth and the average of 129 eggs in that Museum added to 102 other eggs of which I have obtained the measurements, is exactly the same as that given by Hume.

It is not possible ever to confound these eggs with those of the Painted Sand-Grouse (*Pterocles fasciatus*) for these latter are always salmon, bright buff or pink in general tone, whereas those of the Common Pintail Sand-Grouse (*Pteroclurus exustus*) are always greyish, or olive grey in tint when looked at as a whole.

(*To be continued.*)

SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

BY OLDFIELD THOMAS, F. R. S.

No. VII.

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Mr. Shortridge's magnificent collection from Mount Popa and other parts of Central Burma has now been received at the National Museum, and pending the return to London of Mr. Wroughton, who will, I hope, give a detailed report on it, I propose to give notes and descriptions of such things in it as appear to need special attention.

MENETES BERDMOREI AND ITS SUBSPECIES.

The Popa collection contains a series of specimens of a particularly beautiful Menetes, and on laying out the whole available material of the group, I find that there appear to be five recognizable forms, which may provisionally be considered as subspecies of *M. berdmorei*.

It should be premised that the presence or absence of the main lateral black stripes does not appear to be a racial, but, as in many forms of *Tamiops*, a seasonal character, for January and early February specimens, at least of subsp. *consularis*, are quite without them, while they become developed in specimens taken at other times of the year. Whether this is equally the case in the other subspecies our material does not enable me to state. It is however possible that since, even in the fully striped phase, *consularis*, has the least amount of striping, so it has also alone developed (or retained) a seasonal suppression of the stripes, and that other forms have them all the year round. January specimens of the Mt. Popa and other forms would therefore be particularly interesting.

The five subspecies may be diagnosed as follows :—

1. Median dorsal black line and upper lateral ones present, though not very conspicuous. Undersurface strongly washed with buffy. *M. berdmorei berdmorei*.

Rangoon, Martaban and neighbouring parts of Tenasserim.

2. Like *berdmorei* in having inconspicuous median dorsal, and upper lateral blackish lines, but the undersurface white or whitish.

M. b. mouhoti, Gray. (Syn. *Sciurus pyrrocephalus*, M. Edw.) Siam south of Bangkok, Camboja, Cochin-China.

3. Median dorsal and upper lateral dark streaks prominent, all the markings very strongly defined, the main dark lateral band broad and glossy black ; an additional blackish streak edging the belly ; general body colour clear grizzled olive, undersurface and tips of tail hairs pure white. *M. b. decoratus*, subsp. n.

Mount Popa, dry zone of Burma.

4. Markings about as in *decoratus*, but less conspicuously contrasted, owing to the general body colour being darker and duller, more olive brown, undersurface and tips of tail hairs yellowish. Size rather larger than in other forms. Muzzle of skull unusually slender. *M. b. moerescens*, subsp. n.

Annam.—Type from Bali near Nha-trang.

5. No median dorsal stripes or upper dark lateral ones, the only dark streak being that between the light lateral streaks and even this is absent in January and February. Undersurface yellowish white. *M. b. consularis*, subsp. n.

Siam north of Bangkok. Type from Nan. 200 m.

Three specimens from Myawadi and Kaukaryit, E. of Moulmein, seem also to belong here, but as they were killed in January and February, and might possibly represent an "eclipse pelage" of *M. b. berdmorei*, their determination must still remain a little doubtful.

These are the specimens referred to by Blanford (J. A. S. B., XLVII, p. 162, 1878) who recorded their differences from *berdmorei*, but assigned them to *mouhoti*, to which they do not seem to have any greater resemblance.

Measurements and other details of types of new subspecies:—

Menetes berdmorei decoratus.

Head and body, 188 mm; tail 175; hindfoot 43·5; ear 21.

Skull.—Greatest length 49; zygomatic breadth 26·3; palatilar length 23; front of p^4 to back of m^3 9.

Hab.—Mt. Popa, up to about 4,000′.

Type.—Adult female. B. M. No. 14.4.3.4. Original number 3844. Collected, 20th September 1913, by G. C. Shortridge. Presented by the Bombay Natural History Society. Thirty specimens obtained.

M. b. consularis.

Head and body 179 mm; tail 151; hindfoot 40; ear 21. Skull, greatest length (*c*) 49; zygomatic breadth 25·5; palatilar length 23; mp^4 and three molars 8·4.

Type.—Immature female, B.M. No. 2.6.6.6. Original number 159. Collected, 6th October 1901, and presented by Th. H. Lyle, Esq. About a dozen specimens examined, mostly presented by Mr. Lyle.

M. b. moerescens.

Hindfoot 41 mm.

Skull.—(Immature) greatest length 51; zygomatic breadth 28, palatilar length 22·2; mp^4 and three molars 9·6.

Type.—Immature female. B. M. No. 6.11.6.32. Original number 38. Collected at Bali near Nha-trang, Annam, by Dr. J. Vassal.

This animal may hereafter prove to be specifically distinct from the other forms by its large skull and long narrow muzzle, but without fully adult specimens this point cannot be finally settled.

Dremomys rufigenis.

The red-cheeked Squirrel.

This species was originally described from Mount Mooleyit, Tenasserim, and other specimens have since been referred to it from Siam and Yunnan. In addition, two subspecies have been described by Bonhote, *D. r. belfieldi*, from the Malay Peninsula, and *D. r. fuscus* from Annam.

In the Burma collection there are four specimens of it from the Mandalay region, representing a new subspecies, while I also find it necessary to distinguish the Yunnan race as a fifth local race.

It is however to be noted that these animals show a remarkable variation in the shape and size of the skull, some having comparatively small skulls, with conical muzzle, while others have a larger skull with larger brain case and a longer muzzle which is more pinched in laterally. Possibly there may prove to be more than one species among them, but for the moment I leave them provisionally all under the specific name of *rufigenis*. Further series, showing change of skull with age, and exact geographical distribution and intergradation (or otherwise) of the different forms will be needed before any final conclusion can be arrived at.

Dremomys r. adamsoni, subsp. n.

Adamson's red-cheeked Squirrel.

General characters as in true *rufigenis*. Body with the same drabby or muddy suffusion in the olive of the upper surface, the rump and hips similarly more brown. Top of muzzle less rufous, with hardly a trace of ferruginous in its grizzling. Patch behind ear small, dull buffy. Rufous of cheeks less extended, almost replaced by brown between eye and ear. Under surface conspicuously whiter; the interramia and throat almost pure white, the belly hairs with their white tips almost hiding their slaty basis, and the hairs in the inguinal region and on the inner side of the thighs prominently white. In *rufigenis* the hairs of the throat and inguinal regions are more or less washed into ochraceous.

Skull of the size and shape of that of *rufigenis*. Posterior edge of nasals V-shaped, the angle forwards.

Dimensions of the type.—Head and body 200 mm; tail 125; hindfoot 43; ear 21.

Skull.—Greatest length 52; zygomatic breadth 27·5; nasals 16 × 6·5; interorbital breadth 14·4; breadth of brain case 22·2; palatilar length 22; p^4 and three molars 8·8.

Hab.—Upper Burma. Type from Maymyo, alt. 2,800′. Other specimens from Kalaw, S. Shan States, 4,800′.

Type.—Adult male, B. M. No. 14.4.3.3. Original number 3433. Given to Mr. Shortridge by its collector Mr. J. P. Cook. Presented to the National Museum by the Bombay Natural History Society.

This squirrel is primarily distinguished from true *rufigenis* by its much whiter undersurface, and especially its white throat and inner side of thighs.

Named in honour of Sir Harvey Adamson, K.C.S.I., Lieut.-Governor of Burma, to whom Mr. Shortridge and the Mammal Survey in Burma have both been much indebted for assistance of various kinds.

DREMOMYS R. ORNATUS, subsp. n.

The Yunnan red-cheeked Squirrel.

General appearance of *rufigenis*, but skull characters as in *belfieldi*.

Coloration almost as in true *rufigenis*, but the back a clearer olive without any muddy or drabby tinge, and the rump with scarcely any suffusion of brown. Undersurface as *rufigenis*. Sides of face brighter ferruginous, the rusty extending further back on the upper surface of the muzzle, nearly to the level of the ears. Patches behind ears buffy.

Skull very different from that of *rufigenis*, but indistinguishable from that of *belfieldi*. Larger than in *rufigenis*, the muzzle very long, pinched in at sides; the nasals long, their hinder end directed transverse. Forehead broad, flat, with more transversely directly postorbital processes. Brain case large. Zygomatia widely expanded.

Dimensions of the type.—Hindfoot, 44.

Skull.—Greatest length 58·2; condylo-incisive length 50·3; zygomatic breadth 31·6; nasals 21 × 7; interorbital breadth 16·7; breadth of brain case 25; palatilar length 24·2; p^4 and three molars 9·7.

Habitat.—Yunnan (Probably from near Mong-tze).

Type.—Old female. B. M. No. 12.7.25.20. Original number 11. Collected 4th February 1910 by Mr. Alan Owston's collector H. Orii. One specimen.

Distinguished from *rufigenis* by its large skull and long muzzle, and from *belfieldi* by its brighter coloration.

Flying Squirrels.

No Petaurista is contained in the Popa collection, but one was obtained in the Shan States by Capt. Venning, who has presented it to the survey. It proves to be a new subspecies and may be called—

PETAURISTA LYLEI VENNINGI, subsp. n.

Venning's Flying Squirrel.

Similar in general characters to true Siamese *lylei*, but with the undersurface browner, less ferruginous.

Size as in *lylei*. General colour above on superficial view very much as in that animal, the fur with a similar prominent ticking of

white, but the underfur is wholly dark blackish slate, without the concealed suffusion of ferruginous found in the Siamese form. Ears similarly long, with the proectote tending to rufous, and the metectote black, but the former is of a duller tone, approaching fawn. Eyes with black upper and lower rims, without the small rufous spots found in *lylei* both above and below the eye. Undersurface much more brownish than in *lylei*, nearly matching Ridgway's "fawn colour", therefore very different from the brilliant rufous or ferruginous of *lylei*.

Parachute darker throughout than in *lylei*, its upper side dark chestnut brown, its lower vinaceous brown. Hands, feet and tail black.

Skull as in *lylei*, but the bullæ in the single specimen larger than in the available skulls of *lylei*.

Dimensions of the type (measured in the flesh by Capt. Venning).—Head and body 455, tail 635, hindfoot 83, ear 51.

Skull.—Greatest length 82; condylo-incisive length 74; zygomatic breadth 52; nasals $25 \times 16{\cdot}5$; interorbital breadth 18·5; palatilar length 37·2; p^4 and three molars 17·5.

Habitat.—Southern Shan States. Type from Kalaw, west of Taunggyi, alt. 4,700′.

Type.—Adult male, B. M. No. 14.4.3.1. Original number 3374. Collected 15th May 1913, and presented to the Survey by Capt. F. E. W. Venning.

This fine animal is a Burmese representative of the Siamese *P. lylei*, from which it differs by its browner undersurface.

The smaller Flying Squirrels.

Of the smaller Flying Squirrels, the Burmese collection contains three species, one of them belonging to the genus Belomys, and the other two to Sciuropterus, subgenus Hylopetes.

The *Belomys* unfortunately is only represented by a young example from Mt. Popa, and an imperfect skin without skull from Yin Village, Lower Chindwin. Neither is determinable with certainty, but the relationship to *B. trichotis* of Manipur will no doubt prove to be close.

The larger Sciuropterus seemed to be fairly numerous, and Mr. Shortridge succeeded in getting 35 specimens of it. An examination of these shows that it is a local form of *S. phayrei* of Pegu and Tenasserim. It may be called—

SCIUROPTERUS PHAYREI PROBUS, subsp. n.

Like true *phayrei* but tending to be lighter coloured throughout, not so much in the general colour as in the greater extent of whitish on the undersurface of neck, limbs and tail. General colour above

light wood-brown, a prominent patch on sides of cheek and neck greyish white. Muzzle more greyish white than brown. Undersurface nearly wholly pure white, a few hairs only on the sides of the belly with slaty bases.

Hands and feet only brown at the base, and on the middle line, the sides and the whole of the digits whiter—in true *phayrei* the feet are wholly brown with the exception of a few hairs at the root of the claws. Tail drabby basally, darkening to blackish brown at the tip, the darkening less rapid and less intense than in *phayrei*.

Dimensions of the type (measured in the flesh).—Head and body 148; tail 128; hindfoot 30·5; ear 23. Skull, greatest length 39·3; condylo-incisive length 35; zygomatic breadth 24·2; nasals 10·2; palatilar length 17·2; p^4 and three molars 7·8.

Type.—Adult male. B.M. No. 14.4.3.2. Original number 3601. Collected on Mt. Popa at about 3,000′, 7th September 1913, by G. C. Shortridge, and presented by the Bombay Natural History Society.

This form, distinguished by its nearly wholly white feet, is of about the same size as true *phayrei*. On the other hand the Siamese representative of *phayrei* is larger, though on account of its general identity in colour and other characters I should still call it the same species.

Sciuropterus phayrei laotum, subsp. n.

Larger than *phayrei* and *probus*.

Coloration about as in *probus*, though the undersurface tends to be more largely mixed with slaty, and the white itself is less pure. Hands and feet brown with white digits.

Dimensions of the type (measured on the skin).—Hindfoot, 34 mm.

Skull, greatest length 42; condylo-incisive length 38·3; zygomatic breadth 16·2; nasals 10·5 × 6·6; palatilar length 19; p^4 and three molars 7·3 (worn and crushed together, 8·9 in one of Mr. Lyle's specimens.)

Habitat.—Laos Mts. and Siam.

Type.—Adult female. B. M. No. 62.8.16.3. Collected by Mouhot.

Mr. Lyle obtained four examples of this flying squirrel in Northern Siam, but unfortunately two of their skulls are lost, one is broken, and the fourth shows signs of having been in captivity. I have therefore had to select Mr. Mouhot's specimen as the type.

All the specimens agree in the greater length of the hindfoot as compared with *phayrei* and *probus*.

The third small Flying Squirrel in the collection is *Sciuropterus spadiceus*, Blyth, represented by a single specimen from Maymyo near Mandalay, presented by Mr. G. B. H. Fell.

Millardia kathleenæ, sp. n.

Ryley's Soft-furred Rat.

A light coloured *Millardia*, with white tail tip and only 0—2=4 mammæ. Size about equal to that of the largest of the known species.

General colour above, pale sandy fawn, not unlike that of *M. meltada pallidior*, Ryley. Flanks and regions round eyes brighter fawn. Undersurface pale greyish white, the bases of the hairs generally pale slaty, but those on chin and in the inguinal region white to their bases. Ears fairly large, greyish, differing little in colour from the general tone. Hands and feet white; soles with only four pads, the normal murine fifth and sixth completely absent. Tail varying from rather shorter to rather longer than the head and body, thinly haired, not pencilled, greyish brown for the greater part, sometimes the whole of its length, white below and terminally; about 12 rings to the centimeter. Mammæ 0-2=4.

Skull on the whole very similar to that of *M. meltada*. Nasals narrow. Superorbital ridges well marked. Interparietal more triangular, with a greater antero-posterior diameter. Anterior palatine foramina not elongated. Bullæ very large, larger than in any of the known species either of *Millardia* or the other allied genera.

Dimensions of the type (measured in the flesh).—Head and body 145 (range 131-166); tail 148 (130-159); hindfoot 27 (26-30); ear 21 (20-23).

Skull.—Greatest length 35·4; condylo-incisive length 33·2; zygomatic breadth 17·7; nasals 14·5; interorbital breadth 5; interparietal 5·3 × 9·5; palatilar length 16·5; palatal foramine 8·6; upper molar series 5·7.

Hab.—Dry zone of Burma. Most of the specimens, including type, from Pagan: a few from Mt. Popa.

Type.—Adult female. B. M. No. 14.4.3.5. Original number 4095. Collected at Pagan, 16th October 1913.

This Burmese rat forms a very distinct new species, as all the previously known members of *Millardia* have 2-2=8 mammæ, normal sized bullæ, and generally some trace of a fifth hindfoot pad. They are also all inhabitants of the Peninsula of India, not extending east of the Bay of Bengal.

I have named the species in honour of Miss Kathleen Ryley, to whom the Survey is much indebted for the work she has done on its collections during the temporary absence of Mr. Wroughton. I venture to hope that on her return to England she will again take up the subject of Indian mammalogy, with the help of the increased material which the Bombay Society's Survey is bringing together.

Mus nitidulus, Blyth.

Berdmore's Mouse.

This species has always been a puzzle, and owing to the loss of the type from the Calcutta Museum, its proper identification continues to be a difficulty. The two mice from Sikhim that I assigned to it in 1881 are certainly something different, but owing to the bad condition of one and the immaturity of the other I cannot at present make any satisfactory determination of them.

In the Burmese collection Mr. Shortridge obtained two species of *nitidulus* like mice, a larger and a smaller, and on comparing Blyth's description[1] with these two species, I have come to the conclusion that it is the smaller one, the *Mus*, which, pending the arrival of topotypes, should be provisionally assigned to *M. nitidulus*, and that the Leggadilla is new. Beyond saying that it has 12 mammæ or more, I will not now describe the form I assign to *nitidulus*, as this naming may hereafter be again upset, but it certainly agrees very closely with Blyth's description, such as that is.

The larger species I propose to term—

Leggadilla shortridgei, sp. n.

Shortridge's Leggada.

Size comparatively large, larger than in any of the species mentioned by Wroughton and Ryley. Fur thickly mixed with spines, the spines on the back about 8-9 mm. in length. General colour drab-grey, the bases of the fur pale grey or whitish grey, the ends of the hairs pale drab, of the spines black.

Undersurface drabby whitish, the hairs slaty at base; line of demarcation on sides not very sharply defined. Ears scarcely darker than the general colour. Hands and feet white. Tail shorter than head and body; brown above, whitish below, not sharply defined; caudal rings about 16 to the centimeter. Mammæ 3-2=10.

Skull long and slender, with long, narrow muzzle. The raised superorbital bead characteristic of *Leggadilla* as opposed to *Mus* well defined, starting close behind the back of the nasals, and continued backwards across the parietals. Palatal foramina to the level of the front of the inner root of m^1.

Teeth those of a typical *Leggadilla*, conspicuously larger than in the species I refer to *Mus nitidulus*.

Dimensions of the type (measured in flesh):—Head and body 122mm. (range 110-125); tail 101 (85-103); hindfoot 21·5 (20-22); ear 17·5 (17-19).

Skull.—Greatest length 30; condylo-incisive length 29·2; zygomatic breadth 15; nasals 13; interorbital breadth 4·3; interparietal 3·8 × 10; palatilar length 14·3; palatal foramina 7·2; upper molar series 4·6.

[1] J. A. S. B. XVIII, p. 294, 1859.

Hab.—Mt. Popa, Upper Burma.

Type.—Adult male. B. M. No. 14.4.3.6. Original number 3936. Collected 30th September 1913. 36 specimens.

Like *Millardia kathleenæ* this *Leggadilla* represents a considerable extension of the range of the genus to which it belongs. For any small mice previously assigned to *Leggada* and coming from east of the Bay of Bengal are really members of *Mus*, as recently restricted by Wroughton and Ryley, and do not belong to the *platythrix* group, to which alone the name of *Leggadilla* is applicable. All the known forms are from the Peninsula of India.

I have named this well marked species in honour of Mr. Guy C. Shortridge, its discoverer, to whose wonderful energy and collecting talents so much of the success of the Bombay Society's Survey is due.

DESCRIPTION OF A NEW SPECIES OF GORAL (*NEMORHÆDUS*) SHOT BY CAPTAIN F. M. BAILEY.

BY

R. I. Pocock, F.R.S.

Capt. F. M. Bailey recently sent to Messrs. Rowland Ward the skin and skull of an adult specimen of a Goral shot in Po Me in Tibet and, suspecting it might prove of interest from the locality standpoint, if from no other, asked me to examine it. His suspicions proved well founded, for the specimen turns out to be an undescribed form related to the two Himalayan species of Goral (*Nemorhœdus goral*, and *N. hodgsoni*) recently described in this Journal (J. Bombay Nat. His. Soc. XXII, pp. 313-314, 1913). Its relationship with these species and not with the Chinese types of goral is shown by the shortness of the tail and by the extension of the black patch over the knees of the front legs.

NEMORHÆDUS BAILEYI, sp. n.

General colour a uniform dark-brown on the body, rather paler on the sides and belly than on the back, but with no distinct black speckling on the hairs. A black spinal stripe extending from the crown of the head to the tail, deeper in tint upon the head and neck than on the back and gradually fading posteriorly upon the croup. Tail short and mostly black, but with some brown hairs on its upper side. A distinct dark patch above the rhinarium on the muzzle. Upper and lower lips with a narrow white rim, but the rest of the lips darkish. At the upper end of the throat a narrow elongated area of white hairs and the hair-whorls on the inner side at the base of the forelegs forming two large white patches. Forelegs dark yellowish brown, brighter on the feet and on the inner side; a short black patch extending over the middle of the knee but not above or below it to any appreciable extent. Hind legs the same colour on the front, without any definite dark strike extending up their posterior surface towards the root of the tail; inside of thighs at base dirty white.

Measurements.—Length of head and body 42¾ in.; height at shoulder 25¼ in.; length of tail 3¼ in.; of ear 4¼ in.; of horns 5 in.

Loc. Dre on bank of Yigrong Tso (Lake) in Po Me. 9,000 ft. July 3rd, 1913. An adult male, example (*Type*).

The dark coloration and the presence of the black spinal stripe rugged. Hindrip between this species and *N. hodgsoni* rather thin

with the grey goral *N. goral*. The three may be distinguished and contrasted as follows:—

a. A very small white patch at the upper end of the throat; a large conspicuous white patch on each side of the chest in front close to the base of the legs	*baileyi*.
b. A large white or dirty white patch at upper end of throat; patches on the chest near forelegs not white and not sharply differentiated from the adjacent area.	
a^1. Dark brown speckled with black, a dark spinal line, etc.	*hodgsoni*.
b^1. Grey, speckled with black, no conspicuous dark spinal stripe	*goral*.

From the brief diagnosis contained in the table, I have omitted the general coloration of *N. baileyi* which differs from that of *N. hodgsoni* and of *N. goral* in being without the black speckling on the hairs, the colour being remarkably uniformly brown. This may prove to be a distinctive character but the coat is not in sufficiently good condition to justify confidence on that point.

A POPULAR TREATISE ON THE COMMON INDIAN SNAKES.

Illustrated by Coloured Plates and Diagrams.

BY

Major F. Wall, I.M.S., C.M.Z.S.

Part XXII (with Plate XXII, Diagrams and Maps.)

(Continued from page 760 of Volume XXII.)

The next three species dealt with in this series of papers belong to the genus *Zamenis*, and are *Z. fasciolatus*, *Z. ventrimaculatus*, and *Z. diadema*. *Z. mucosus*, the commonest, and most widely distributed has been already discussed in a former paper (Vol. XVII, p. 259). When Mr. Boulenger's catalogue appeared in 1896, the genus included 34 species chiefly Asian and American. Of this total 10 occur within Indian limits.

ZAMENIS FASCIOLATUS.

The Fasciolated Rat-snake.

History.—Russell in his great work on the Indian snakes, published in 1796, was the first to mention this snake, and this Volume contains an excellent coloured plate (No. XXI) of a handsomely marked juvenile specimen. Shaw in 1802, and Daudin in 1803, next referred to it, and then Cantor in 1839. Since then many writers have contributed scraps of information concerning it.

Nomenclature.—(*a*) *Scientific.*—It received its specific baptism in 1802. Shaw's name (a diminutive form of the Latin *fasciatus* "banded") having reference to the narrow crossbars usually so distinct in early life. It was assigned to its present place among the *Zamenis* by Günther in 1864. The generic name is from the Greek "Zamenes" meaning "very strong."

(*b*) *English.*—I can suggest no better name than the fasciolated rat-snake which is the equivalent of its scientific designation.

(*c*) *Vernacular.*—"Nooni paragoodoo" is the name Russell gives on the authority probably of natives in Vizagapatam, since "gedi paragoodoo" or "grass runner" is the name given to the Krait in the Vizagapatam District, according to the same author. I am told that "nooni" is Telugu for oil, and "paragudu" means "runner." The former word which I believe is also used for glistening is probably suggested by the smooth and polished character of the scales.

Colour.—The prevailing hue dorsally is some shade of brown, or olive-brown, some specimens being very light and almost yellowish, others very dark. Young specimens are beautifully ornamented

with crossbars, spotted or variegated with black and brown on a whitish ground. These bars are most conspicuous anteriorly and gradually disappear before, at, or at some distance behind the middle of the body. They become increasingly obscure as age advances, and some old specimens are nearly uniform in colour. The head is usually uniform olivaceous, and without any markings, but a young specimen of mine in Fyzabad was marbled with lighter hues. The belly is uniformly whitish, or yellowish. In my young specimen it was greenish-yellow.

General characters.—The head is of moderate length and width. The upper jaw projects rather prominently, and is sometimes rather parrot-like. A "canthus rostralis" is moderately evident. The nostril is of fair size, and occupies the upper two-thirds of the suture between the nasal shields. The eye is about half the length of the snout, and its round pupil easily discerned in life. A neck is fairly evident. The body is round, moderately long and smooth, and the tail is slender in form, and accounts for one-fourth to one-fifth the length of the snake.

Identification.—In many respects it is very like Hodgson's rat-snake (*Coluber hodgsoni*), a Himalayan species. It bears a superficial resemblance to Cantor's rat-snake (*Coluber cantoris*), another Himalayan form, and some other species of *Zamenis* and *Coluber* as well as the cobra. It is best recognised by attention to its scale rows first. These are usually 21 at a point two headslengths behind the head, 23 in midbody, and 17 two headslengths before the vent. Added to this the anal shield is divided; the supralabials are 8, the divided 3rd with the 4th and 5th, or the divided 4th with the 5th and 6th touching the eye; and the præocular touches the frontal shield.

Length.—It grows to upwards of three feet. The largest I have examined measured 4 feet 2½ inches.

Disposition.—It appears to be a plucky and vicious snake when molested. The few comments in this direction to be found in the literature on the species are in agreement. Stoliczka says it is rather a fierce snake when molested, and Blanford speaking of a specimen he encountered says, 'though young, it was one of the fiercest snakes he ever captured. The only specimen I have ever seen alive, probably a hatchling, was remarkably active and plucky. I understand from Mr. Millard, who is very familiar with it, that it is on account of its habit of flattening its body and a general resemblance in colour and appearance to a small cobra when moving that the Konkani natives so frequently declare it is a female cobra. My young specimen gave me a lively exhibition of its cobra-like behaviour. It erected itself probably as high relatively as a cobra would do, and flattened itself very remarkably.

Habits.—I believe it frequents jungly tracts chiefly, but will stray

into populated areas, and according to Stoliczka has been known to enter houses in Calcutta.

Food.—A specimen sent me from Patna had swallowed a rat. Stoliczka, however, remarks that it feeds on frogs and worms.

Breeding.—Very little is known in this connection. A specimen which I took to be a hatchling, measuring $11\frac{1}{4}$ inches, was captured by me in Fyzabad in the month of July. Mr. D'Abreu told me of a hatchling he obtained in Patna in May.

Distribution.—Though Jerdon remarks that it is not uncommon in the Carnatic, this has not been my experience. I never obtained one when in residence in Southern India (Trichinopoly, Madras, Berhampore, Cannanore, and Bangalore), and I noticed that in the list of Tranvancore snakes given by Ferguson in this Journal (Vol. X, p. 68, and Vol. XIV, p. 386), this is not mentioned as one of the 58 land snakes enumerated. In my whole Indian career (19 years), I have had one specimen brought to me, *viz.*, in Fyzabad, and only one sent to me for identification, except the examples that have reached me from our Secretary from around Bombay. It is poorly represented in numbers in both the British and Indian Museums. The fact, however, that Nicholson supports Jerdon in saying that it is fairly common in Mysore; and Mr. Millard tells me it is quite a common snake in the Konkan, added to the fact that it is often mistaken for the cobra in the Konkan, and has a fairly wide distribution in Peninsula India justifies its inclusion in these papers.

It occurs in Northern Ceylon. In India it is found from Cape Comorin to the base of the Himalayas, excepting, perhaps, Travancore. It does not extend as far as Rajputana and the Punjab on the north-west, nor further east than Calcutta. I have elsewhere* given good reasons for doubting the accuracy of the locality of Cantor's specimen in the British Museum said to be from the Province Wellesley in the Malay Peninsula. The exact localities known to me are shown in the accompanying map.

Lepidosis.—*Rostral*—Touches 6 shields; the rostro-internasal sutures usually greater than the rostro-nasal. *Internasals*—Two; the suture between them two-thirds to three-fourths that between the præfrontal fellows, about two-thirds the internaso-præfrontal suture. *Prefrontals.*—Two; the suture between them subequal to the præfronto-frontal sutures; in contact with internasal, postnasal, loreal, præocular. *Frontal*—Touches 8 shields; the fronto-supraocular sutures about twice as long as fronto-parietals. *Supraoculars*—Length subequal to frontal breadth about two-thirds the frontal along a line connecting the centres of the eyes. *Nasals*—Two; in contact with the first and second supralabials. *Loreal*—One. *Præoculars*—One touching, or almost touching the frontal. *Postoculars*—Two.

* Pois. Terr. Snakes, Brit. Ind. Dom. 1908, Footnote, p. 21.

(1) Jaffna (Willey. Spol. Zeylan, April 1906, p. 33), (2) Anamallay Hill (I.M.), (3) Collagelly Hills (I.M.), (4) Mysore (Nicholson, Ind. Snakes, p. 87), (5) Madras (B. M.), (6) Ellore (Blanford, I. A. S. B. XLVIII, p. 115), (7) Vizagapatam Dist. (B. M.), (8) Calcutta (I. M.), (9) Monghyr (I. M.), (10) Patna (F. W.), (11) Benares (B. M.), (12) Allahabad (I. M.), (13) Fyzabad (F. W.), (14) Gwalior (B. M.), (15) Saugor (Bo. M.), (16) Nagpur (D'Abreu *in epistola*), (17) Salsette, Bombay, Thana, (Bo. M.), (18) Poona, Khandalla (Bo. M.)

B. M., implies British Museum; I. M., Indian Museum; Bo. M., Bom. Nat. Hist. Society's collection; F. W., the author.

Temporals—Two; the lower touching three supralabials (usually the 5th, 6th and 7th). *Supralabials*—8; the 3rd, 4th and 5th or 4th, 5th and 6th touching the eye. Either the 3rd or 4th usually divided and touching the eye. *Infralabials*—6; the 4th, 5th and 6th, or 5th and 6th only, touching the posterior sub-linguals; the 6th largest and in contact with 3 scales behind. *Sublinguals*—Two pairs; the anterior rather the longer, the posterior completely separated. *Costals.*—Two headslengths behind head 21, midbody 23, two headslengths before vent 17. In the step from 21 to 23, a row appears on each side of the vertebral; in the reduction from 23 to 21 the two rows next to the vertebral unite; in the reduction from 21 to 19 (which occurs close to the preceding step, in fact, the absorption of rows in these two steps may be reversed), the 3rd above the ventrals is absorbed; in the reduction from 19 to 17, the 7th or 8th row above the ventrals is absorbed. Vertebrals not enlarged. No keels. Apical facets present in pairs.

Ventrals.—197 to 225. *Anal*—Divided. *Subcaudals*—73 to 92 in pairs.

Dentition.—(From a single skull in my collection). *Maxillary*, 13 subequal teeth, succeeded (after a gap that would accommodate one tooth), by two teeth little if any larger than the preceding ones. *Palatine* 11, decreasing in length from before backwards, the anterior subequal to the maxillary. *Pterygoid* 15 to 16, decreasing in length from before backwards. *Mandibular* 18, decreasing in length anteriorly, and posteriorly from about the 5th. I think the dentition is sufficiently distinctive to dissociate this species from the genus *Zamenis* in which several species with various dental characters are now grouped.

I take the view in this paper and for the reasons specified in a footnote that the forms of *Zamenis* described under the names of (1) *ventrimaculatus* (Gray), (2) *rhodorhachis* (Jan.), (3) *ladacensis* (Anderson), (4) *dorsale* (Anderson), and (5) *chesnei* (Martin), are all varieties of a single species for which the foremost name must stand having priority. Boulenger in his Catalogue (1893, Vol. 1, pp. 398 and 399) has already united Nos. 1 and 5, under the name *ventrimaculatus*, and Nos. 2, 3 and 4 under *rhodorhachis*, but distinguishes between these two*.

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* The descriptions of these two forms given by Boulenger in his Catalogue (1893) are identical with the exception of the ranges of the ventral, and subcaudal shields. I have now examined a large series of both forms from localities as widely separated as Almora in the East to Aden in the West. The dentition of all these agrees with that of the type of *ventrimaculatus* in the British Museum and the type of Anderson's *ladacensis* in the Indian Museum which I have also examined. I can discover no differences in lepidosis (examining specimens of each most critically side by side) except in the ranges of the ventrals and subcaudals. In one form both are more numerous than in the other. This becomes more noticeable in a comparison of the aggregates of these shields. Specimens of each agree in colouration, and they appear to grow to a similar length. I have examined the

ZAMENIS VENTRIMACULATUS (GRAY).

GRAY'S RAT-SNAKE.

History.—First referred to by Gray in 1834, who figured it in his Illustrations of Indian Zoology (Plate LXXX, Vol. II). The type specimen collected by General Hardwicke is in the British Museum, but the locality where found has been lost sight of. It is one of the few shielded forms. (Ventrals 206, subcaudals 98, Boulenger.) Under the name *Z. chesnei* Martin redescribed it in 1838. It has been redescribed under various other names, or confused with other species by many other authors.

Nomenclature—(*a*) *Scientific.*—"Ventrimaculatus" is from the Latin and implies spotted belly, in allusion to the irregular series of roundish spots seen at the edge of the ventrals in the forepart of the belly.

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geographical distribution of each and append maps which show that their distribution is almost the same. One (the few shielded) extends South of the Indus whilst the other has not yet been recorded so far South in India. A list is also appended showing the number of specimens of each that I have examined and added to the specimens in Boulenger's Catalogue and the ventral and subcaudal ranges. I think from these considerations most herpetologists will hesitate to accept these forms as distinct species. In this paper, therefore, I treat them all as one species under the name *ventrimaculatus*.

SYNOPSIS OF SPECIMENS.

—	No. of examples.	Range of ventrals.	Range of subcaudals.	Aggregate of foregoing.	Locality.
		Variety Typica.			
Few shielded	6	199-210	82-112	281-321	Persia.
Many do.	13	214-241	126-137	341-376	
Few shielded	2	207-209	109-112	316-331	Aden and around.
Many do.	10	222-236	124-138	346-372	
Few shielded	17	194-211	95-121	295-326	Sind, Baluchistan. Thar and Parkar. Rajputana, Punjab.
Many do.	..	....	....	....	
Few shielded	18	190-221	101-125	293-335	W. Himalayas, from Almora to Gilgit, and Chitral.
Many do.	10	215-246	126-145	347-391	
		Variety rhodorhachis (Jan.)			
Few shielded	..	....	....	....	Persia.
Many do.	6	217-236	125-137	347-363	
Few shielded	2	211-222	111-122	322-344	Chitral.
Many do.	..	....	....	....	

(*b*) *English.*—For want of a better title, and owing to the difficulty of finding anything distinctive in this member of a large genus, I propose to associate Gray's name with it.

(*c*) *Vernacular.*—According to Captain Shakespeare who sent 7 young specimens to our Society's collection from Koweit on the Persian Gulf it is called "dawaib-al-khail" in Arabia.

Identification.—The scale rows two headslengths behind the head are 19, in midbody 19, and two headslengths before the vent 15, or more commonly 13. The anal shield is divided. The supralabials are 9; the 4th divided and the 4th, 5th and 6th touching the eye (less commonly they are 8; the 3rd divided and the 3rd, 4th and 5th touching the eye).

There are only about 12 others of our Indian snakes with the scale rows as given above. 6 of these have an entire anal shield, and none have the condition of the supralabials peculiar to this species. The divided 3rd or 4th supralabial must be carefully looked for (*see* figure).

General characters.—This is a remarkably graceful species, the body is smooth on the surface, round, slender and elongate, and the tail is unusually long, and tapering accounting for more than one-fourth the total length. The head is moderately narrow, and the snout moderate in length, and obtuseness. The nostril occupies about the upper two-thirds of the suture between the nasal shields. The eye of medium size has the pupillary border of the iris fine specked with gold, so that the round shape of the pupil is clear evident in life. A neck is moderately evident. The attenuation of the body is very gradual, and continues so insidiously that the origin of the tail is barely if at all indicated. The belly is slightly angulated on each side.

Colour and varieties.—The variety *typica* of Gray, and far the commonest variety is very variable in its prevailing tones and markings. It may be dirty yellowish, olive-greenish, olive-brownish, stone coloured, or greyish. The posterior part of the body for a variable length, and the tail are uniformly coloured. Anteriorly the body is variously marked with spots, or crossbars, or both. A common form is shown in our plate where crossbars are evident, alternating with a single series of largish costal spots. These bars may be as long as the intervals, as in our plate, or only half the length. In another very common form there are no crossbars, but 5 or 6 rows of small spots arranged quincuncially. In some 3 series of small spots alternate with one another each side, and the uppermost with a series of narrow crossbars. The head partakes of the prevalent dorsal hue, and exhibits a blackish spot on the lore, a blackish oblique stripe below the eye, another on the temporal region to the gape, a band between the eyes, and various marks on the occiput. A crossbar, or a single longitudinal stripe, or twin stripes may

be present on the nape. These very variable marks are obscure, or more or less obsolescent in some specimens especially old ones but are quite conspicuous in the young. In a large number of examples there is a conspicuous, white, or buff zone around the eye. The belly in life is saffron yellow, or a paler shade, sometimes merging to pinkish posteriorly, or exhibiting a pinkish suffusion laterally. A more or less irregular series of black spots occurs at the edges of the ventrals beyond their angulation.

In the specimens I saw in life in Chitral the skin was dun coloured, and the scales in the anterior part of the body were black on their basal margins and pale yellowish or whitish on their apical margins where overlapped. This produced a beautiful variegation chiefly visible when the snake inflated itself under excitement. This variety is the prevailing one in India, in Chitral, Sind, Baluchistan, Persia, Arabia, and N. W. Africa.

Variety *rhodorhachis* (Jan) (From the Greek "rhodos," a rose and "rachis," the spine.) This variety which is far less abundant than *typica* is characterised by a reddish stripe down the spine which in some specimens is a brilliant vermillion, in others a vivid rose, and in others a brownish, or rusty red. It may involve from 3 to 5 scales in the breadth of the snake, and commencing at the nape may extend to the tail tip, or end at the vent, or sometimes before midbody. In other respects this form is marked as in *typica*, but I think all the specimens I have seen showed the quincunciate arrangement of small spots, and none any crossbars. I have seen the red spinal stripe very limited in extent, and but faintly indicated, and such specimens are completely intermediate between the forms *typica* and *rhodorhachis*.

There are specimens in the British Museum from Persia, and I have seen specimens from Chitral and from Aden Hinterland (Dthalla).

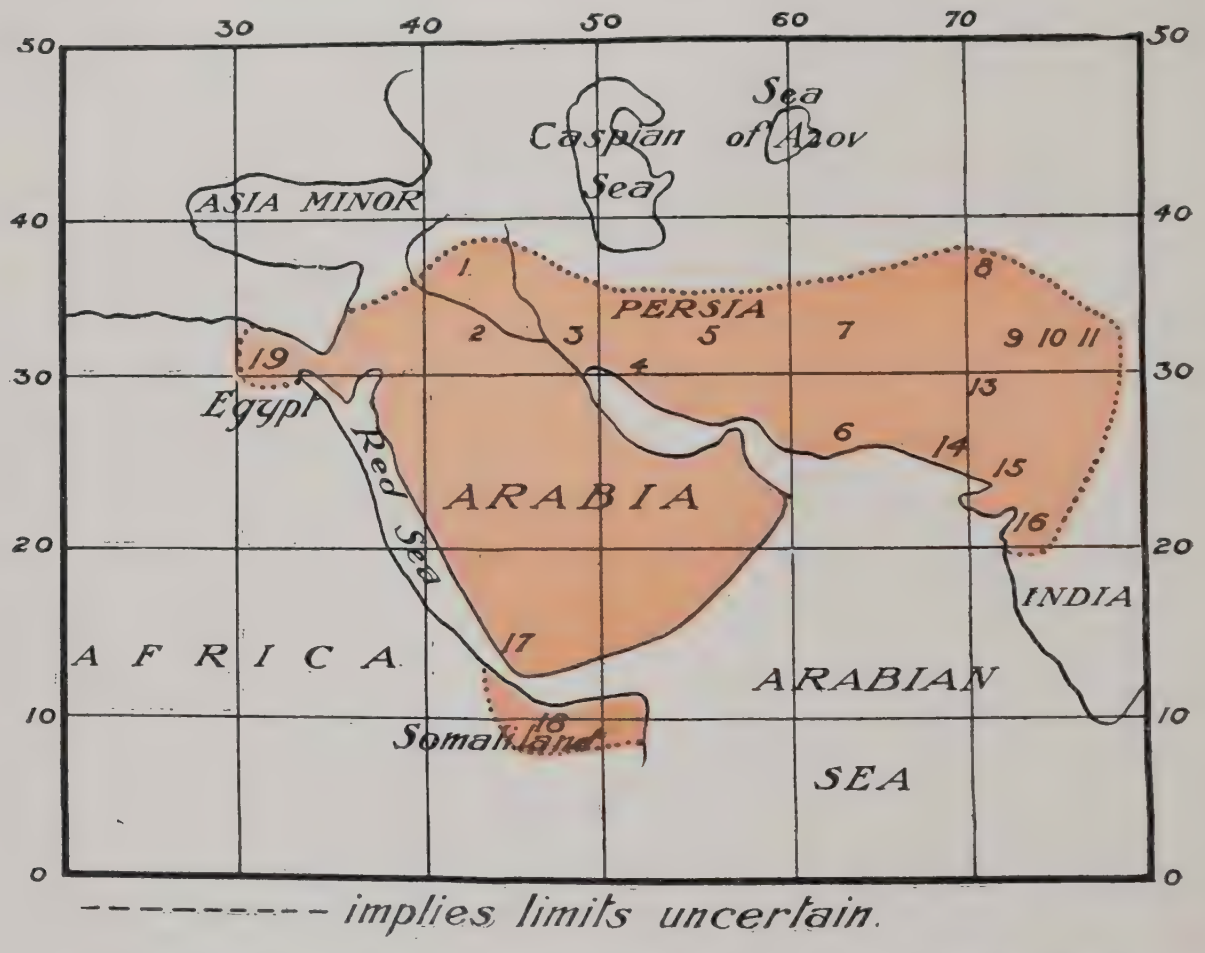
Variety *subnigra* (Boettger) uniform slatish in the anterior part of body, merging to purplish brown posteriorly. A narrow blackish mesial line on the neck expanding gradually and merging to purplish-brown so as to suffuse the entire dorsum. A few black spots costally. Head olive-greyish. Belly yellow beneath the neck, merging to purplish-brown behind, and with the usual black spots at the sides of the ventrals. Described by Boettger from an example from Somaliland, also recorded by Boulenger from the Abian Country, Arabia.

I have seen a uniformally blackish specimen from the Aden Hinterland (Dthalla) which I considered a melanotic example. (Ventrals 231, subcaudals 138).

Dimensions.—Adults usually measure from three to four feet. The largest specimen I have seen which had its tail slightly imperfect was a ♂ which taped four feet, and half an inch in the fresh state.

Map 1.

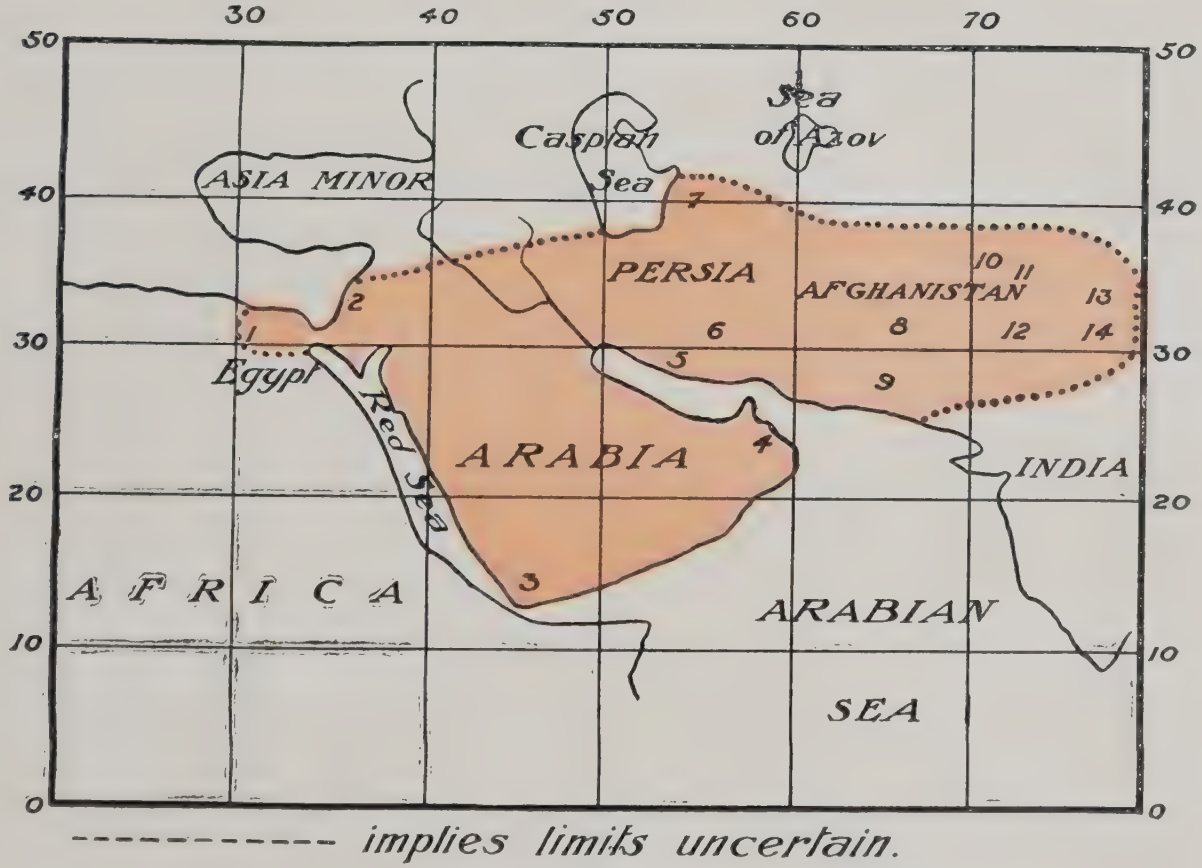
Distribution of the few-shielded variety (Ventrals 199—222. Subcaudals 82—122. Aggregate 281—344).



(1) Mesopotamia (B. M.), (2) Euphrates (B. M.), (3) Fao (B. M.), (4) Bushire (B. M.), (5) Persia (B. M.), (6) Gwadar (B. M.), (7) Afghanistan (B. M.), (8) Chitral (F.W.), (9) Lahore (Bo. M.), (10) Mussoorie (Bo. M.), (11) Almora (F. W.), (12) Delhi (F. W.), (13) Hyderabad (Bo. M.), (14) Karachi (B. M.), (15) Deesa (Bo. M.), (16) Deolali (Bo. M.), (17) Aden Hinterland (Bo. M.), (18) Somaliland (Boettger), (19) Egypt (Murray, Vert. Zool. Sind, p. 378).

Map 2.

Distribution of many-shielded variety (Ventrals 214—246. Subcaudals 124—145. Aggregate 341—391).



(1) Egypt (B. M.), (2) Dead Sea (B. M.), (3) Aden Hinterland (B. M.), (4) Muscat (B. M.), (5) Bushire (B. M.), (6) Shiraz (B. M.), (7) Transcaspia, (B. M.), (8) Baluchistan (B. M.), (9) Regan (B. M.), (10) Chitral (F. W.), (11) Gilgit (B. M.), (12) Punjab (Bo. M.), (13) Ladakh (Anderson), (14) Kasauli (Bo. M.)

B. M., implies specimen is in the British Museum; Bo. M. in our Society's collection at Bombay; F. W., the author's authority.

Haunts.—The many specimens brought to me in Chitral, Malakand and Delhi were encountered on the hill sides or in open spaces, or cultivated ground. There is no jungle worth the name in those localities, and I think the same may be said of most of the countries it inhabits. Several were killed inside our very congested little fort at Drosh, and another inside the mess at Chitral where it was seen in the roof. Another was killed in a house at Malakand where I think it was seeking retirement for the winter. Major Magrath tells me too that it is common about bungalows in Cantonment in Peshawar.

Habits and disposition.—I have met a good many during the day time, either basking in the open close to cover into which they quickly withdrew on my approach, or I disturbed them in the act of swallowing a victim. On one occasion the victim which had been swallowed proved so bulky that it seriously handicapped the snake's movements, and it could not in consequence evade capture. It is probably about at night too sometimes since it preys on Stoliczka's gecko, a lizard I never saw except after dark. It is a very active snake, but so far as a very limited experience of living specimens is concerned I do not think it is fierce or aggressive. Alcock and Finn who collected many specimens on the Perso-Baluch border also remark that it is not fierce. Many specimens I was unable to catch owing to the precipitate manner in which they disappeared on my approach, and one that I liberated went off so hurriedly that I had great difficulty in recovering it.

Food.—On three occasions I found a lizard of the genus *Calotes* had been taken. Twice this was the species *versicolor*, and on the third occasion probably the same species. Twice I found Stoliczka's gecko *Gymnodactylus stoliczkæ* had furnished the meal.

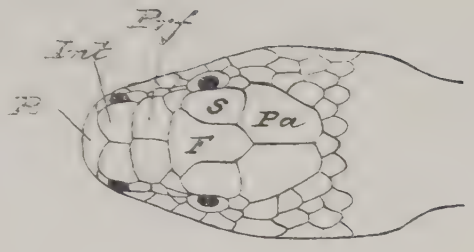
Breeding.—My three gravid specimens were captured in May and June, so that it is probable that mating occurs in the early spring, soon after they emerge from hibernation. The smallest dam was 2 feet 11 inches, a length which would be attained by about the end of the third year of life. There were 3 eggs in one, 8 in another and 9 in the third, so that the species cannot be considered prolific. The largest eggs which measured from one, to one and a half inches in length, contained no trace of an embryo, so that it seems probable that the snake is oviporous, and that the embryo does not begin to develope until after oviposition. The hatchlings probably emerge from the egg in August and September. I have had young specimens measuring $12\frac{7}{8}$ and $13\frac{1}{4}$ inches in September. The ♂ claspers in adults are studded with hook-like horny appendages. The secretion of the anal glands is white, and looks like white paint.

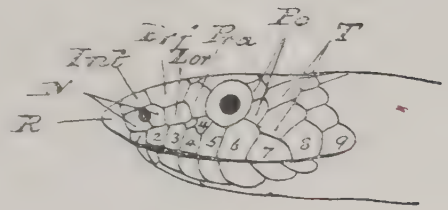
Growth.—The smallest specimen I have any record of is the one mentioned by Stoliczka captured at Sobattoo which measured $11\frac{1}{2}$ inches, and I think this will prove to be about the length of a

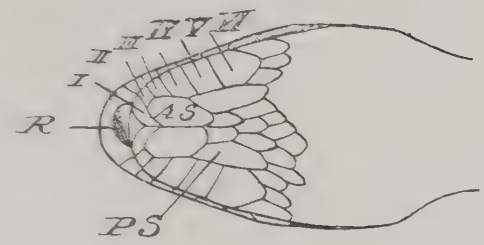
newly hatched specimen. As far as I can judge the species appears to grow about 10 or 12 inches each year until mature, *i.e.*, about the end of the third year, but like other snakes they will grow considerably after attaining sexual maturity.

Distribution.—It has been found in the Indian Tropical Region in the Konkan, (Bombay, Poona, and Deolali), on the confines of the Tropical Region, [Deesa, (B. N. H. S. Collection), Jeypore (Sclater), and Delhi (F. W.)], but otherwise only in the Mediterranean subregion of the Holarctic (Sind, Rajputana, Punjab, Western Himalayas, (West of Almora,) Kashmir, Chitral, Afghanistan, Baluchistan, Persia, Transcaspia, Mesopotamia, Arabia, Egypt and Somaliland). It is common everywhere on our N. W. Frontier. Major Bukhle tells me it is abundant at Sukkur, Sind. Alcock and Finn found it frequently on the Perso-Baluch boundary, and I have examined many specimens from Baluchistan. In the Aden Hinterland it was one of the commonest snakes met with. It is evidently plentiful in Persia judging from the many specimens in various Museums from that country.

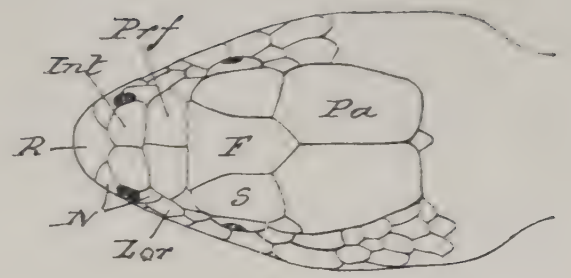
Lepidosis.—*Rostral.*—Touches 6 shields, the rostro-nasal sutures larger than the rostro-internasal. *Internasals.*—Two; the suture between them rather less than that between the præfrontal fellows, subequal or rather less than the internaso-præfrontals. *Præfrontals*—the suture between them, rather greater than the præfronto-frontal; in contact with internasal, postnasal, loreal and præocular. *Frontal*—Two; touches 8 shields; the fronto-supraocular sutures twice or more than twice the fronto-parietals. *Supraoculars*—About as long, and as broad as the frontal. *Nasals;*—Two, in contact with the 1st and 2nd supralabials. *Loreal*—One; longer than high. *Præocular*—One; touching frontal. *Postoculars.*—Two. *Temporals*—Two; the lower in contact with 3 supralabials (usually the 6th, 7th and 8th). *Supralabials.* Usually 9; the 4th divided and the 4th, 5th and 6th touching the eye (sometimes 8; the 3rd divided and the 3rd, 4th and 5th touching the eye). *Infralabials*—Six; the 6th largest and in contact with 3 scales behind normally. *Sublinguals*—Two pairs; the posterior longer, and in contact with the 5th and 6th infralabials, quite separated by small scales. *Costals*—Two headslengths behind the head 19, in midbody 19, two headslengths before the vent 13. In the reduction from 19 to 17, the 3rd or 4th row above the ventrals is absorbed, in the second step from 17 to 15 the two rows next to the vertebral coalesce; and from 15 to 13 the two rows next to the vertebral again fuse. As the first two steps occur close together, they are sometimes reversed, or intermixed. Keels absent. Apical facets in pairs. *Ventrals*—Angulate laterally. In the few shielded "form" 190 to 222; in the many shielded 214 to 246. *Anal*—Divided *Subcaudals*—In the few shielded "form" 82 to 125, in the many shielded 124 to 145.

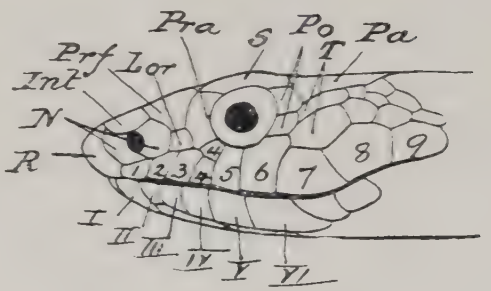


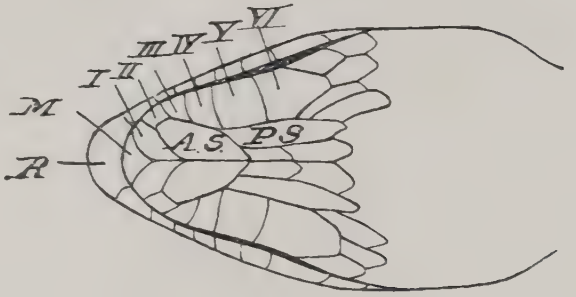




A. S.	Anterior Sublinguals.
F.	Frontal.
Int.	Internasals.
Lor.	Loreal.
M.	Mental.
N.	Nasals.
Pa.	Parietals.
Po.	Postoculars.
Pra.	Præoculars.
Prf.	Præfrontals.
P. S.	Posterior Sublinguals.
R.	Rostral.
S.	Supraocular.
T.	Temporals.
I—IX.	Supralabials.
I—VI.	Infralabials.







Zamenis fasciolatus (1/1)

Zamenis ventrimaculatus
(× 2)

Dentition.—From 7 skulls in my collection, including Variety *typica*, Karachi (Ventrals 201 + 114), Variety *typica*, Chitral (Ventrals 239 + 136), Variety *rhodorhachis*, Chitral (Ventrals 215 + 113), Variety *typica*, Sukkur (Ventrals 204 + 121). *Maxillary* 10 to 14, slightly increasing backwards, then a gap that would accommodate two teeth followed by a pair of obliquely set, enlarged teeth. *Palatine*, 9 to 11, the median about as long as the median maxillary, slightly decreasing forwards and backwards. *Pterygoid*, 15 to 24, gradually decreasing backwards. *Mandibular* 15 (14 ?) to 20 (21 ?), the first 3 or 4 progressively increasing, the posterior gradually decreasing.

Plate.—Our illustrations are good, and show one of the commonest colour forms. This Plate also contains three figures of another member of the genus *Zamenis*, which will be discussed in the next paper.

(*To be continued.*)

NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.).

BY

MAJOR H. H. HARINGTON, Indian Army.

Having spent a considerable portion of my leave working through that interesting group of birds—the Indian *Timeliides*—and in so doing collected together a large mass of notes; I venture to publish these, as a great number of birds new to the Fauna of India, have been added since Mr. Oates published his admirable work on the birds of India.*

The descriptions of these new species have appeared from time to time in various Journals and Bulletins, which are not always available to residents in the East. I hope, therefore, by republishing these descriptions, I shall at least be of some assistance to others who have been unable to procure them.

I have also made an attempt, not altogether successfully, to bring some sort of order into this very complex group of birds. My first and chief difficulty has been to know what birds should be admitted into the *Timeliides*, as I have been unable to find any definition giving their characteristics. Mr. Oates in his "*Crateropodidæ*" included a great number of Families and Genera which are now not considered to belong to the *Timeliides*, many of these have been placed in other Families by Dr. Sharp in his "Hand List." There, however, still remain several Genera which I consider should be removed from this sub-order.

The nearest definition of the characteristics of the *Timeliides*, I can find is that given by Jerdon.† This unfortunately does not cover all the Genera which are at present included in this sub-order.

"Legs and feet stout and large; bill various in form and length almost always compressed, usually notched; wing short and rounded; tail longish, graduated; plumage often lax." (Jerdon.)

From the above I have presumed to formulate the following, which I hope covers all those I consider should be included within the *Timeliides* :—

> Wings, short and rounded; powerful legs and feet, suitable for progression on the ground; shape of bill, and length of tail, very variable; plumage of the young not markedly different from that of the adult; non-migratory in habits; and no seasonal change in plumage.

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* "Birds" Fauna of British India.

† Jerdon "Birds of India". Vol. ii., p. 1 (1863).

The *Timeliides* as above constituted are strictly non-migratory and very sedentary in their habits, living the whole year round practically in the same locality.* They have no distinctive summer and winter plumage, which at once separates them from the Warblers. Very little appears to be recorded about the plumage of the young, which however is generally very like that of the adult; they have, however, no distinctive plumage, differing from that of the adult, like the majority of the Thrushes (*Turdidæ*), this at once removes them from that family.

Trinomials.

" As the use of trinomials for sub-species—or better, geographical or local races—does not seem to be generally understood, it may be explained that when a species is divided into two or more races, or when two or more species are grouped as races of one species, then each of these races must have a trinomial appellation. It is impossible to say which is the oldest or parent form, therefore the first-named race of all those grouped under one species is arbitrarily taken as the typical race, and its name becomes that of the species."

" It cannot be gainsaid that the trinomial system is of the greatest possible use scientifically as demonstrating the close relationship of geographical forms of the same species, just as the binomial system demonstrates the relationship of species of the same genus."†

As the use of trinomials is possibly new to a great number of Members of the Society, I have given the above definition from "The Hand List of the British Birds", which explains their use and advantage very much better than I possibly could.

Mr. Oates in the "Fauna of India " did not always take notice of geographical races, some he considered distinct species, whilst others he treated as local forms, only just mentioning the differences which occur between them and the typical species he was describing. So that, often from his descriptions it is impossible to tell whether the bird he is actually describing is quite distinct from any other species, or only differs in some minor detail.

For example, in the Chestnut-headed Laughing-Thrushes (*T. erythrocephalum*, *nigrimentum*, *chrysopterum*, *erythrolæma*, *melanostigma*, etc.), there is nothing in Mr. Oates' descriptions, which tells at a glance that all these birds are really only the geographical races of one species, and merely differing from each other in some small detail, such as the colour of their ear-coverts, supercilium,

* Capt. C. H. T. Whitehead informs me that the local form of *Trochalopterum lineatum*, inhabiting the hills in the vicinity of Kohat, during the cold weather descends down to the lower ranges, this can hardly be called true migration, it is very interesting, and probably the same local movement takes place amongst other species inhabiting bare and open hills.

†"A Hand List of British Birds," Hartert, Jourdain, Ticehurst and Witherby, 1912.

etc. By the use of trinomials, it at once becomes apparent that all these different birds are nothing but the geographical representatives of one species, which is very widely distributed in the hills, extending from the N. W. Himalayas to the Malay Peninsula.

I have therefore taken full advantage of the use of " trinomials " to show, wherever I consider a relationship exists. The great majority of the birds so dealt with have been looked on as "good species", and doubtless, so they are, when only a few specimens from different localities are compared. However, when a large series of allied species are examined it will be found, that they either grade into each other, or show such a strong family likeness, that the presumption is that the connecting links exist, or have existed, and by the use of trinomials this relationship is at once apparent.

Some may, however, consider that I have used " trinomials " rather too freely, and that their use should be reserved to denote sub-species or local forms not worthy of specific rank. It is often extremely difficult to say which are "good species," or which are only a " local forms," when you find both occupying well marked areas.

By the use of trinomials, I do not wish to degrade a bird from specific to sub-specific rank, but only to show that they are the geographical representatives of a certain species, and have been guided by the rule that no two sub-species of the same bird can be found inhabiting the same area.

Distribution.

The Timeliides appear to me, to be of very recent origin, and still in a state of evolution; they are resident and non-migratory and consequently a great many species have developed into numerous geographical races.

Their central stronghold seems to be about Burma, from whence they have extended through Assam into India and the Island of Ceylon,* eastwards they are found in China, Japan, and the Islands of Formosa and Hainan. An astonishing number of birds from these two Islands show a marked relationship to the Himalayan Fauna, indicating, I think, that these islands must have been connected with the mainland up to a very recent date. Southwards they extend down the Malay Peninsula to the numerous islands, in fact, throughout the Oriental or Indian Region, and I think that the sub-order *Timeliides* should be restricted to birds of this Region, and not thrown open to all the waifs and strays of the bird world, so that it has become a veritable " Ornithological Waste-paper Basket."

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* Some Ceylon and S. Indian birds, such as *Pomatorhinus, Arrenga* and others show a marked affinity to the Sumatran and Javan Fauna, possibly showing some former land connection in this direction.

A very interesting fact, which I have not seen mentioned before, is that although the *Timeliides* are so well represented in Burma and Malay States, none have been recorded from the Andaman and Nicobar Islands, obviously showing that these islands must either be of recent formation, or had no connection with the mainland since the appearance of this very large sub-order birds.

Whilst working up the distribution of this fascinating group, I was greatly struck by the manner in which species in certain localities were liable to variation. I soon found that by taking specimens and grouping them according to these different localities, any differences at once became apparent. In the hills these areas are more or less well marked, in the plains the distribution is not so easy, or my knowledge of the physical geography at fault.

For some unaccountable reason, some species extending over a wide area, seem to take every opportunity to vary, so we find geographical races, wherever there is any isolation. Whilst other species occupying practically the same area, show hardly any variation whatever.

All birds are more or less restricted to certain elevations, some being entirely "Plains-dwellers," never ascending the hills to any great height, whilst others are only found in the hills at certain altitudes. A very curious fact, which I have never seen accounted for, is the remarkable way in which, certain birds are only found at great heights in the Himalayas, occur at much lower levels in Assam and Burma.

It is also a well-known fact that species inhabiting both a very dry and a damp locality differ in colour. Birds from the former being paler, whilst those from the latter are darker and more highly coloured.

Another interesting fact noticed is that amongst species liable to variation and which have a wide distribution (and represented by numerous races) very often the sub-species furthest apart geographically, that is at the ends of the chain or extremities of the "horse-shoe" resemble each other far more closely than those near together and often are hardly separable.

This is well illustrated in the "Scimiter-Babblers." *Pomatorhinus erythrogenys erythrogenys*, Vigors, from the N. W. Himalayas, is only separable in size from *P. e. imberbis*, Salvadori, from Tenasserim; (both these races are noticeable for having pure white unstriped breasts). Intervening we have the following well-marked sub-species, *P. e. ferrugilatus*, Hodgson, from Sikhim, which has the breast almost entirely grey: in Assam *P. e. macclellandi*, Jerdon, and in Yunnan and North-East Burma *P. e. gravivox*, David, both of which have boldly striped breasts; and no doubt, connecting links exist grading from one sub-species into the other, showing that there is really only one species, which is represented by

well-marked geographical races or sub-species over the extent of its distribution.

A great number of birds which are found both in Southern India and Lower Burma are very similar, and often hardly separable. *Pellorneum ruficeps ruficeps*, Swainson, and *Alcippe phœocephala phœocephala*, Jerdon, both from Madras, and at one extremity of the "horse-shoe" are very like *P. r. subochraceum*, Swinhoe, and *A. p. phayrei*, Blyth, from Lower Burma and Tenasserim, at the other extremity, while separating them we have well marked races. Many other interesting examples might easily be given, Mr. Stuart Baker has also noticed the same fact whilst working at the Game Birds and Pigeons.

These same unknown reasons might also account for the numerous cases of similarity or "mimicry" which exist between birds of totally different genera and orders, such as between *Mixornis rubricapillus*, Tickell, and *Stachyrhidopsis ruficeps* (Blyth), which from their coloration are only separable after careful examination. *Dicrurus ater*, *Crypsirhina varians* and *Surniculus lugubris* (the King-crow, Black racket-tailed Pie, and the Drongo-cuckoo) can all be very easily mistaken for each other.

The distribution of the "Plains Dwellers" is naturally restricted by mountain ranges and desert tracts, whilst that of Hill birds appears to be limited by certain great river valleys. This is most marked in what may be called the "Assam Back-water." Here we find in the same Province many birds from one side of the river are quite distinct from those of the other, some sub-species, from the Dafla Hills to the North of the Brahmaputra being quite distinct from those from the Garo, Khasia and Cachar hills, situated to the South of the river.

I do not wish to imply that each area has its own special breed of birds, but if there is any variation in a species, these differences will probably occur within certain well-marked tracts. I may possibly be wrong in my different areas as I only came to the following conclusions, from studying specimens and not from any local knowledge, except in the case of Burma.

In the Himalayas, we find the following rivers forming very natural boundaries, the Indus, Sutlej and Brahmaputra. In Burma in a less degree we still have small rivers marking well defined areas. In this Province the most noticeable barrier is the "dry-zone" of Central Burma, which effectually separates Northern Burma from Lower Burma, and the Chin Hills on the West from the Shan Hills on the East.

India.

Commencing at the N.-W. we have the following well-marked areas:—

1. *Trans-Indus.*—Probably from the right or West bank of the

Kabul river through the Afridi country down to Baluchistan. This tract is very noticeable for its poverty in *Timeliine* birds, and for the great number of Palæarctic forms which occur.

2. *N.-W. Himalayas.*—From the Indus to the Sutlej valley, which includes the southern portions of Kashmir and Chamba State (N. Kashmir is probably Central Asian and Tibetian). Here we find the *Timeliides* better represented, however many well-known families have not yet found their way across the Sutlej valley.

3. *Nepalese.* —From the Sutlej to the Brahmaputra, and includes the following sub-regions: (1) Gharwal and Kumaon. (2) Nepal. (3) Sikhim and Darjeeling. (4) Butan and Dafla Hills, Assam.

This region is particularly rich in the *Timeliides.*

4. *Tibet.*—Practically unknown.

5. The practically unknown tract, East of the Brahmaputra, along Abor, Mishmi, and Patkoi ranges, down on the one hand to the Chin Hills, North of Tamu; and on the other to Yunnan.

6. *The Assam "backwater."*—The country to the South of the Brahmaputra, including the Garo, Khasia, Cachar and W. Manipur Hills.

The above areas are well marked, many of them having geographical races peculiar to themselves.

In the plains the distribution is not so clearly defined and may possibly comprise the following:—(1) In the West we have Sind, which seems to be particularly rich in birds, the *Timeliides*, however, being very poorly represented. (2) Punjab and United Provinces. (3) Bengal and the plains of Assam and Arrakan. (4) Rajputana. (5) Central Provinces, Deccan. (6) Madras and Mysore in the plain. (7) The Western Ghats, Travancore and the hills of S. India, here we find each range with its own particular Laughing Thrush. (8) Ceylon which also has its dry and wet-zones, the birds of which appear to differ considerably.

Burma.

This province is extremely rich in its Avifauna, on the West in the Chin Hills and Arrakan, we have chiefly Himalayan and Assam birds or their local sub-species, a few birds, however, showing a relationship to those of Yunnan. In the N.-E. we have Chinese; and in the S.-E. Malayan forms; whilst in the central plains we have a few birds peculiar to Burma itself. Commencing at the N.-W. and taking the hill ranges first, we have the following well-defined areas:—

1. *Chin Hills.*—From the South of Tamu (I have taken this to be the dividing line, as just at this point on the frontier between Burma and Manipur, the hills are of no great height, the dividing line is most probably the Yu and Manipur rivers). The Chin Hills here connect up with the southern ranges of Manipur, and continue

southwards in an unbroken ridge down to the sea, and divide Arrakan from Burma. The chief height in this range is Mt. Victoria of over 10,000 ft. To the northwards from Tamu, we have the unexplored mountains running up to the Mishmi and Abor country, in this mountain chain we have Saramathi of over 12,000 ft., which is quite unknown, as far as its ornithology.

2. *The Myitkyina and Bhamo Hills*—On the N.-E. of Burma, these are offshoots of the mountains of Yunnan, and contain a number of Chinese birds. This area is probably bounded on the South by the Shweli River.

3. *The Ruby Mines range*, which consists of that little known ridge of mountains which run up to over 8,000 ft., which extends from just below the point where the Shweli joins the Irrawaddy, through the Ruby Mines District, and in a N.-E. direction to the Salween. The southern limits of this unexplored tract is the low-lying plateau along which the Mandalay-Maymyo-Lashio railway line is laid. The birds of this vast tract are quite unknown and probably many new species will be discovered along this range.

4. *The Shan Plateau*, South of the above, and to the West of the Salween, and includes the Karennee sub-region. To the East the Salween—Mekong watershed is practically unknown.

5. The mountains of Tenasserim with Muleyit Mt.

In the Plains.

6. *Northern Burma*, which is a particularly damp low-lying area, may be said to consist of the Bhamo, Myitkynia and Upper Chindwin Districts, and North of about 23 N. parallel of latitude.

7. *The Dry-Zone*, South of the above to about 19½ N. parallel of latitude. This central portion of Burma consists of a very dry undulating country, and, where not cultivated, covered with dense thorny scrub.

8. *Lower Burma*, which is also extremely wet, is situated to the South of the above.

From the above well-marked areas or zones, it is not surprising that Burma is rich in its birds, while many of its outlying ranges still remain to be explored. Over one thousand different species and sub-species of birds have already been recorded from within the Province out of under seventeen hundred, which are known to occur in the whole of India and Ceylon.

Classification.

I have followed Mr. Oates as closely as possible in his "*Craterpopodidæ*" with the following additions and omissions:—

Additions.

Paradoxornithidæ.—I think it is now agreed that this family is more nearly allied to the *Timeliidæ* than to any other. It wants a

great stretch of imagination to place the "Crow-Tits" amongst the Crows (*Corvidæ*), and they differ from the Tits (*Paridæ*) in many important particulars.

Acanthoptila nepalensis, Hodgson.—This little known bird is undoubtedly very closely related to *Argya* and *Babax*, and possibly forms a connecting link between these two genera. It shows this, in the formation of its bill and description of plumage, but chiefly in the colouration of its eggs, which are described as a "verditer-blue," this exactly applies to the colour of the eggs of Babblers, such as *Argya* and *Crateropus*, and a colour, I believe, quite unknown amongst the Warblers (*Sylviidæ*). Very little still appears to be known about this species. Mr. Oates' reasons for placing it amongst the *Sylviidæ* seem to have been that he considered it had both a summer and winter plumage. If *A. pellotis*, (Hodgs.) and *A. leucotis*, (Hodgs.), are one and the same species, which they undoubtedly are, it, therefore, has two phases of plumage, one of which shows a considerable amount of white. This is similar to *Gypsophila cripsifrons* (Blyth) and *Gampsorhynchus rufulus* (Blyth.), in which species the adults of both have a considerable amount of white, which is only assumed by slow degrees.

Omissions.

Brachypteryginæ.—With the exception of *Elaphronis palliseri* (Blyth), the position of which is still uncertain, I have omitted the whole of this sub-family, as they undoubtedly belong to the *Turdidæ*, many species of which appear to have been refused admission to that family, solely because their young have advanced in a stage of evolution and have discarded their distinctive juvenile garb.

Zosterops.—Dr. Sharpe in his "Hand List" has given the "White-eyes" family rank under the title of *Zosteropodæ*. They have a very wide distribution; and their pointed wings and migratory habits at once removes them from the *Timeliides*.

Æthorhynchus and Ægithina, (Ioras).—Have been placed by Dr. Sharpe in the *Pycnonotidæ*. Both these genera have a summer and winter plumage, which at once separates them from the *Timeliides*.

Chloropsis and Irena.—Have both been placed in the *Pycnonotidæ* by Dr. Sharpe. They have remarkably short tarsi and fairly long wings, which removes them from amongst the Babblers.

Brachypodinæ.—The Bulbuls have rightly been removed from amongst the *Timeliides* and given family rank with the title of *Pycnonotidæ*.

Melanochlora sultanea, (Hodgson).—Mr. Stuart Baker has shown that both by its nidification and the colour of its eggs, the Sultan-Bird is a true Tit, and Hodgson was originally right, when he placed it amongst the *Paridæ*, to which family it has again been relegated by Dr. Sharpe.

Cephalopyrus flamiiceps, (Burton).—The Fire-Cap has also been placed amongst the *Paridæ*.

Leptopoeceile sophiæ, (Severtz.) has been placed by Dr. Sharpe in the *Regulidæ* (Goldcrests).

Psaroglossa spiloptera, (Vigors).—The Spotted-wing is undoubtedly very nearly connected with both *Sturnia* (Small Tree Mynas) and the Glossy Calornis (*Calornis chalybeius*, Horsfield) resembling the former in habits, notes and nidification, and the latter in colour of its eggs, which in both species are pale-blue spotted with reddish-purple. Spotted eggs are not unknown amongst the Mynas, this at once removes one of Mr. Oates' objections to placing it amongst the *Sturnidæ*.

Hypocolius ampelinus, (Bonaparte).—The Grey Hypocolius, Sharpe's Hand List IV, p. 275, has been placed in the *Prionopidæ*, which includes *Hemipus* and *Tephrodornis* (Wood-shrikes) from India.

I have raised the *Timeliides* to the dignity of a sub-order, and given family rank to the *Paradoxornithidæ*, *Craterapodidæ*, *Timeliidæ*, *Sibiidæ* and *Liotrichidæ*.

Order—PASSERES.

Sub-Order.—Timeliides.

Wings short and rounded ; powerful legs and feet, suitable for progression on the ground ; shape of bill and length of tail very variable ; plumage of the young not markedly different from that of the adult ; usually non-migratory in habits ; and no seasonal change in plumage.

Family—Paradoxornithidæ.

Sexes similar in plumage ; nostrils completely hidden by a profusion of feathers and plumes ; habits partly terrestrial, partly aboreal ; size chiefly small with one exception (*Conostoma*) ; wing short, rounded, fitting close to the body ; length of tail variable ; bill peculiarly short and thick.

Family—Crateropodidæ.

Sexes similar ; nostrils not completely hidden by plumes or feathers ; habits chiefly terrestrial. Size medium (about that of an English thrush) ; wing short, rounded, and fitting close to the body ; length of tail, never shorter than the wing ; bill variable in size and shape.

Family—Timeliidæ.

Sexes similar ; nostrils exposed ; habits various ; some genera purely terrestrial, others arboreal ; size chiefly small ; wing short, rounded, and fitting close to the body ; length of tail and bill very variable.

Family—Sibiidæ.

Sexes similar ; nostrils exposed ; habits strictly arboreal ; size medium ; wing moderately long ; legs and feet not particularly strong (this last characteristic should remove them from the *Timeliides*).

Family—Liotrichidæ.

Sexes dissimilar ; habits arboreal ; size small ; bill short ; wing and tail about equal (the majority, I think, should be removed from the *Timeliides*).

My thanks are due to the British Museum authorities for kindly allowing me to work through their splendid collection of birds, these notes being practically based on specimens in the Natural History Museum. My thanks are especially due to Mr. W. R. Ogilvie-Grant for his advice and assistance, more especially in working out many of the complicated keys. My thanks are also due to the Hon'ble Walter Rothschild and Dr. E. Hartert for allowing me to work through their valuable collection at Tring and for forwarding numerous species for comparison.

To Mr. E. C. Stuart Baker my thanks are due for many valuable notes and suggestions and to Mr. N. B. Kinnear for his assistance in preparing the manuscript for the press. Finally, I must apologise for the incompleteness of these notes ; this is due in some cases to the want of material, and also to the fact that the notes have been made at home and put together out in India, where I have no books to assist or correct any mistakes which may have crept in.

My hope is, however, poor and wanting these notes may be, they will be of assistance to others.

I shall be extremely obliged if members will kindly point out any mistakes, and more especially if they will let me have any notes on this most interesting group of Indian birds. Very little is known about the plumage of the young of the *Timeliides*, which appear to be very like that of the adult, but in many cases seem to be slightly different. I, therefore, hope members so situated will collect series of birds and more especially those of the nestlings and young and send them in to the Society's Museum, which is also in want of adult birds. At some future date, I hope to revise this paper, and so will be extremely obliged if members will kindly point out any mistakes, and more especially if they will let me have or send to the Journal any notes on this most interesting group of Indian birds.

Peshawar, 5*th May* 1914. H. H. H.

PART II.

Family—Paradoxornithidæ.

Legs and feet very large and strong, wings short, rounded, and fitting close to the body ; sexes alike in plumage ; bill short, stout, and culmen much curved ; nostrils completely hidden by numerous soft

feathers and plumes; plumage soft and lax; tail variable in length; non-migratory in habits; plumage of young presumably like that of the adult.

This family is rightly placed in the *Timeliides*, to which it undoubtedly belongs from its short, rounded wings, and powerful legs and feet. Mr. Oates' reasons for placing them amongst the crows (*Corvidæ*) appear to have been solely due to their concealed nostrils. Jerdon points out that too much importance should not be placed on the shape of the bill, a feature which is very variable in the *Timeliides*, some of which have short, straight bills, and others very long and curved ones; whilst some have numerous hairs overhanging the nostrils; in others the nostrils are quite free. I think it requires a very great stretch of imagination to place the Crows. Tits (*Paridæ*) and *Paradoxornithidæ*, all within the same family, solely because their nostrils are completely hidden, and ignoring the great difference in habits, nidification and all other structural differences.

I consider, therefore, Mr. Oates' name of "Crow-Tits" rather a misnomer, and propose "Parrot-billed" from the shape of their bills. There is always a great difficulty in giving suitable English names to birds quite distinct and totally different to the European Fauna; and, I think, something should be done to give names more appropriate than those now existing.

Very little appears to be known about the habits of this very compact family, the nidification of those of which we are acquainted with, form a very useful aid to their classification, and when that of the remainder is known, we shall probably find that each genera is well marked by the colour of its eggs.

The "Parrot-billed Babblers" are confined to the East and N.-E. of the Indian Empire extending from Nepal and Sikhim into Tibet and China, also occurring throughout Assam, Burma and the Islands of Formosa and Hainan, the great majority being only found at a considerable elevation in the hills.

With the exception of *Conostoma*, all the genera grade into each other, having very much the same structural peculiarities, differing *inter se*, chiefly in the size, shape of the bill, and length of tail.

I have for the present kept to Mr. Oates' classification, but consider Jerdon was right in keeping the following separated *Heteromorpha*, *Chleuasicus* and *Suthora*. Undoubtedly, all three have the same characteristics, they, however, differ greatly in size and colouration; and, I think, by keeping them separate, the study of the family would be greatly facilitated, as the above-mentioned genera consist of three very distinct types of birds.

The generic name *Scæorhynchus*, Oates, is already pre-occupied and in its place *Psittiparus*, Hellmayer, 1903, has been proposed.

I also propose the generic name of *Neosuthora* with *N. davidiana* (Slater), as type. This genus differs from Suthora in having an extremely short tail, and much deeper bill, and approaches *Psittiparus* very much in these respects, differing only in size.

I have divided the *Paradoxorinthidæ* into two sub-families—

(1) *Conostoma*, which consists of only one species, remarkable for its larger size and longer bill.

(2) *Paradoxornithinæ*, all of which have remarkably short, thick bills, and, I think, as mentioned before, should be divided into the following genera:—

(*a*) *Paradoxornis*; (*b*) *Heteromorpha*; (*c*) *Chleuasicus*; (*d*) *Suthora*; (*e*) *Psittiparus*; (*f*) *Neosuthora*.

Conostoma, Hodgson, 1841.

This genus contains only one species, which is the largest of the order. It has the following characteristics: tail slightly longer than the wing

and not very graduated; a short rounded wing, the first four primaries graduated, the fifth, sixth and seventh equal and longest; nostrils completely hidden by numerous soft feathers (not stiff bristles); bill stout and fairly long, and not short and greatly curved like the other genera of this order; rictal bristles well developed; no hairs overhanging the nostrils; legs and feet stout, hind claw long and thick.

CONOSTOMA ÆMODIUM, Hodgson.

The Red-billed Jay-Thrush.

Hodgson, J. A. S. B., x., p. 857 (1841); Sharpe, Cat. B. M. vii, p. 485; Oates, F. B. I., i., p. 61.

Description as in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Tibet and W. China, only found at very high altitudes.

PARADOXORNIS, Gould, 1836.

Characteristics: a short rounded wing, the first four primaries graduated, the fifth and sixth equal and longest; tail slightly longer than the wing and greatly graduated; legs and feet very strong, the hind claw also stout and long; nostrils completely hidden by feathers; rictal bristles well developed; bill short, stout, greatly curved, deeper at the base than length from gape. The lower edge of upper mandible greatly curved downwards at the base (parrot-like); the eggs of this genus are spotted.

Paradoxornis have wonderful curved edges to their bills, evidently intended for cutting purposes, and remind one rather of "Garden" or "rose" scissors, in which the two blades are curved to fit each other.

* PARADOXORNIS FLAVIROSTRIS, Gould.

Gould's Parrot-billed Babbler.

Gould, P. Z. S., 1836, p. 17; Sharpe, Cat. B. M., vii., p. 496; Oates, F. B. I., i., p. 62; Baker, J. B. N. H. S. viii., p. 167.

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Distribution.—Terai of E. Himalayas, Nepal to Assam, Sylhet, Cachar and Khasia Hills.

Nesting.—See Ibis, Jan. 1895, p. 42.

PARADOXORNIS GUTTATICOLLIS, David.

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David, N. Arch. Mus., vii., Bull. p. 14. (1871); Sharpe, Cat. B. M., vii., p. 497; Oates, F. B. I., i., p. 63; Baker, Ibis 1906, p. 87, J. B. N. H. S., xiii, p. 400; Harington, J. B. N. H. S., xiv, p. 596.

Description as in Oates, F. B. I.

Distribution.—Assam, Khasia and Naga Hills, Bhamo and Shan States, W. and S. China.

"The nests are deep cups, measuring about $3\frac{1}{2}$ inches in depth and the same in diameter. They are very typical of the sub-family, being made almost entirely of the bright yellow bark of a kind of grass, lined with yellowish strips of grasses and bamboo leaves, so that, as a whole, they appear bright yellow. The nests are placed from 3 to 4 feet above the ground in a clump of bamboos, straggling shrub or a tall stout weed. The eggs two or three in number. The shell is extremely fragile, and have the ground colour, a whitish to greenish-grey, with faint blotches and spots of brownish, and measure ·93″ × ·63″" (Baker).

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* PARADOXORNIS HEUDII, David, 1873.

Sharpe, Cat. B. M., vii., p. 497.

Hab.—Nankin, China.

feathers and plumes; plumage soft and lax; tail variable in length; non-migratory in habits; plumage of young presumably like that of the adult.

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Description as in Oates, F. B. I.

Distribution.—Assam, Khasia and Naga Hills, Bhamo and Shan States, W. and S. China.

"The nests are deep cups, measuring about $3\frac{1}{2}$ inches in depth and the same in diameter. They are very typical of the sub-family, being made almost entirely of the bright yellow bark of a kind of grass, lined with yellowish strips of grasses and bamboo leaves, so that, as a whole, they appear bright yellow. The nests are placed from 3 to 4 feet above the ground in a clump of bamboos, straggling shrub or a tall stout weed. The eggs two or three in number. The shell is extremely fragile, and have the ground colour, a whitish to greenish-grey, with faint blotches and spots of brownish, and measure ·93″ × ·63″" (Baker).

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* PARADOXORNIS HEUDII, David, 1873.

Sharpe, Cat. B. M., vii., p. 497.

Hab.—Nankin, China.

Suthora, Hodgson, 1838.

Oates, F. B. I., i., p. 63; Jerdon, B. I., ii, p. 6.

I have followed Mr. Oates, for the present, in keeping the following together, *Heteromorpha*, *Chleuasicus* and *Suthora*, but consider they should be separated, and that this genus should only contain birds of the type of *S. nepalensis*, Hodgson, and *S. poliotis*, Blyth. All the *Paradoxornithidæ*, with the exception of *Conostoma* grade into each other, having almost the same structural characteristics, but fall into groups from their size, and description and colour plumage. I think, therefore, it a mistake keeping two birds, such as *S. unicolor* (Hodgson) and *S. poliotis* (Blyth) in the same genus.

The above three genera all have the following characteristics: tail longer than the wing, and greatly graduated: wing short and rounded, the first four primaries graduated: a short deep bill: nostrils completely hidden by feathers: rictal bristles well developed, no hairs overhanging the nostrils: legs and feet very strong, with the hind claws stout and long. Each genus having the following characteristics of its own.

Heteromorpha, type *H. unicolor*, Hodgson.—Size medium, wing over 3 inches: bill short, deep, about equal in depth at the base to its length from the gape: plumage plain and practically of the same colour. Nothing appears to be known about the nidification of this species. I think in this genera might be included those Suthora of the *S. webbiana* and *S. w. brunnea*, Anderson type; the eggs of these being a pale spotless blue.

Suthora, type *S. nepalensis*, Hodgson.—Size very small, wing well under 2 inches; bill very short and curved, longer from the gape than deep at the base; plumage very handsome, generally a patch of black on the throat, and upper plumage a rich golden brown. All the members of this proposed genera, whose nidification is known, lay spotless blue eggs like those of the *S. w. brunnea* in the *S. webbiana* group.

Chleuasicus, type *C. ruficeps*, Blyth.—Very like *Suthora*, differing in size, wing well over 2 inches: bill equal in depth at the base to length from gape: colour rufous brown, with no conspicuous spot on the chin or throat. Eggs as far as known a spotless blue.

Key, S. poliotis and nepalensis.

I.—A well defined black supercilium—

A.—Crown and whole upper plumage orange brown.

a. Ear-coverts slaty-grey.

a^1. Breast and abdomen pale-grey .. .. *S. p. poliotis.*

b^1. „ „ „ orange-fulvous .. *S. p. ripponi.*

c^1. „ grey „ „ „ .. .. *Sub-sp. ?* *

b. Ear-coverts light chestnut. (Breast white, abdomen orange-fulvous) .. .. .. *S. p. humei.*

B.—Crown ashy-brown, remainder of upper plumage orange-brown. (Ear-coverts pale-grey, lower plumage orange-fulvous.) .. .. .. *S. nepalensis.*

II.—No supercilium—

C.—Crown and whole upper plumage orange-brown.

c. Ear-coverts brown.

d^1. Breast white, abdomen orange-fulvous .. *S. v. verreauxi*

e^1. „ ashy, „ „ „ .. .. *S. v. craddocki.*

d. Ear-coverts slaty-grey. (Breast and abdomen fulvous?) .. .. *S. p. feæ.*

D.—Crown pale-orange, remainder of upper plumage golden-olive .. .. *S. morrisoniana.*

* (An undescribed sub-species procured by Mr. C. Hopwood in the Northern Chin Hills.)

Suthora unicolor, Hodgson.

The brown Parrot-billed Babbler.

Heteromorpha unicolor, Hodgson, J. A. S .B., xii, p. 448 (1848).
Suthora unicolor, Sharpe, Cat. B. M. vii, p. 493; Oates, F. B. I., i, p. 64.
Description as in Oates, F. B. I.
Distribution.—E. Himalayas, Nepal, Tibet and W. China. Nothing appears to be known about its nidification.

Suthora nepalensis, Hodgson.

The Nepal Suthora.

Hodgson, Ind. Rev., ii. p. 32 (1838); Sharpe, Cat. B. M., vii, p. 488; Oates, F. B. I., i., p. 65.
Description as in Oates, F. B. I.
Distribution.—Nepal. I can find nothing recorded about its nesting.

Suthora poliotis poliotis, Blyth.

Blyth's Suthora.

Blyth, J. A. S. B., xx, p. 552 (1851); Sharpe, Cat. B. M., vii, p. 487; Oates, F. B. I., i, p. 65.
Description as in Oates, F. B. I.
Distribution.—Khasia, Naga, and Kachin Hills, Bhamo District, Burma.
I procured this little bird at Sinlum in the Bhamo Hills, but failed to get its nests. I only met with it in fairly high tree jungle, and shot it in company with *Ægithaliscus talifuensis*, Rippon. It appears to have much the habits of a tit.
Iris brown; bill black; legs and feet brown (Sinlum birds).
Its nest has often been taken, but I cannot find anything recorded. I have a pair of eggs kindly given me by Mr. Stuart Baker; these are a very pale-blue and quite spotless, and in size slightly smaller than the eggs of *S. w. brunnea*, Anderson's Suthora.

Suthora poliotis humei, Sharpe.

The Sikhim Suthora.

Sharpe, Cat. B. M., vii, p. 489 (1883); Oates, F. B. I., i, p. 64.
Description as in Oates, F. B. I.
I think the name "Crow-tit" invented by Mr. Oates rather a misnomer for these beautiful little birds; and suggest that, failing any other the name "Suthora" be adopted for them, all these nearly allied sub-species are "black-fronted," this name is therefore not distinctive.
Distribution.—Sikhim and Darjeeling. I can find no records of its nidification.

Suthora poliotis feæ, Salvadori.

Salvadori, An. Mus. Civic. Genov. (2), vii, p. 364 (1889); Oates, F. B. I., i, p. 66 (footnote).
Description as in Oates, F. B. I.
(I have not been able to examine a specimen of this species.)
Distribution.—Karennee. This appears to be a very rare sub-species.

Suthora poliotis ripponi, Sharpe.

Rippon's Suthora.

Sharpe, Bul. B. O. C., xv, p. 96 (1905).
Description.—Very similar to *S. p. poliotis*, Blyth, from the Naga Hills. Differs in having abdomen bright orange-fulvous instead of grey; and ear-coverts pale-grey.

Length about 4·4″, wing 1·9″, tail 2·25″, tarsus ·75″.
Distribution.—Mt. Victoria, Chin Hills.

SUTHORA VERREAUXI CRADDOCKI, Bingham.

Bingham, Bull, B. O. C., xiii, p. 55 (1903).
Description:—"Forehead, crown, nape, back, rump and upper tail-coverts orange-brown, shaded on the nape and back with olive-brown; the primaries edged externally with white, the secondaries and tertiaries broadly edged with bright orange-brown; the primary coverts brown, forming a conspicuous patch on the upper portion of the wing; tail brown, the outer webs of the feathers bright orange-brown for three-fourths of their length from the base; lores, cheeks, and a long supercilium white, the white of the cheeks extending on to the sides of the neck; ear-coverts brown; chin and throat black, shading into gray on the upper breast; abdomen and undertail coverts bright orange-brown." (Bingham).
Upper mandible horny, lower fleshy yellow, legs and feet fleshy-brown. Length about 4″, wing 1·8″, tail 1·9″, bill 0·3″, tarsus 0·9″.
Hab.—Mekong watershed, Keng Tung State.
Note.—Resembles *S. v. verreauxi*,* but abdomen and under-tail coverts bright orange-brown, not white.

SUTHORA WEBBIANA BRUNNEA, Anderson.

Anderson's Suthora.

S. brunnea. Anderson, P. Z. S., 1871, p, 211; Oates, F. B. I., p. 68,†Harington, J. B. N. H. S., xvi. p. 740; *ibid*, xix, p. 111, *id.*, Ibis, 1914, p. 6.

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* SUTHORA MORIZONIANA, O. Grant.
O. Grant, Bull. B. O. C., xvi, p. 116 (1906); Ibis, 1907, p. 188.
Hab.—Mt. Morrison. Formosa.
SUTHORA VERREAUXI VERREAUXI, Sharpe.
Sharpe, Cat. B. M., vii, p. 488, (1883.)
Distribution.—West Szechuen and Moupin, China.
† *Suthora webbiana.*—There are numerous geographical races of this species from China and Mongolia, and many are very hard to distinguish.
SUTHORA WEBBIANA WEBBIANA, Gray.
Gray, P. Z. S., 1852, p. 7870; Sharpe, Cat. B. M., vii, p. 490.
Hab.—N. China.
SUTHORA WEBBIANA STYANI, Rippon.
Rippon, Bull, B. O. C., xiii, p. 54, 1903.
Hab.—W. Yunnan.
SUTHORA WEBBIANA SUFFUSA, Swinhoe.
Swinhoe, P. Z. S., 1871, p. 300.
Hab.—Upper Yangtze, China.
SUTHORA CONSPICILLATA, David.
David, N. Arch. Mus., vi, Bull., p. 14, 1870; Sharpe, Cat. B. M., vii, p. 489.
Hab.—N. W. China.
SUTHORA PRZEWALSKII, Berez and Bianchi.
Berez. and Bianchi, Exped. Potan. Gansu, p. 67, 1894.
Hab.—Kansu.
SUTHORA ALPHONSIANA, Verreaux.
Verreaux, N. Arch. Mus., vi, Bull., p. 35, 1870; Sharpe, Cat. B. M., vii, p. 489.
Hab.—Yunnan, Szechuen.
SUTHORA BULOMACHUS, Swinhoe.
Swinhoe, Ibis 1863, p. 300; Sharpe, Cat. B. M., vii, p. 490.
Hab.—Formosa.
SUTHORA MANTSCHURICA, Tacz.
Tacz., Bull. Soc. Zool. Faun., 1885, p. 470.
Hab.—Mongolia and Corea.
S. fulvicauda and S. longicauda, Campbell, are probably the young of this species.

Description as in Oates, F. B. I.

Distribution.—Yunnan and the Kachin Hills, East of Bhamo.

I found it a very common little bird at Sinlum in the Bhamo Hills. During the cold weather it goes about in large family parties, haunting bushes and trees; in the breeding season it retires to long grass and rushes where it builds its nest. This is a compact little cup, which is placed near the ground. The eggs, generally three in number, are pale, spotless blue and measure ·64 × ·52 inches.

Suthora fulvifrons, Hodgson.

The fulvous-fronted Parrot-billed Babbler.

Suthora fulvifrons, Hodgson, J.A.S.B., xiv, p.579 (1845); Oates, F.B.I.,i, p. 66.

Chleuasicus fulvifrons, Sharpe, Cat. B. M., vii, p. 494.

Description as in Oates, F. B. I.

Distribution.—Nepal and Sikhim. Nothing appears to be known of this species, which is quite distinct from the *S. poliotis* group.

Suthora ruficeps ruficeps, Blyth.

Blyth's Parrot-billed Babbler.

Chleuasicus ruficeps, Blyth, J. A. S. B., xiv, p. 578 (1845); Sharpe, Cat. B. M., vii., p. 494.

Suthora ruficeps, Oates, F. B. I., i, p. 67.

Suthora oatesi, Sharpe, "Hand List" iv, p. 70, 1903.

Description as in Oates, F. B. I.

"This bird is almost an exact counterpart of *P. ruficeps ruficeps* differing from it chiefly in its blunter bill and more graduated tail."

Dr. Sharpe proposes the name of *oatesi*, for this species to save confusion with its very near ally, *P. r. ruficeps*; both are extremely alike and the similarity of names is very liable to cause mistakes, and therefore I think it should be adopted.

Distribution.—Sikhim.

Suthora ruficeps atrisuperciliaris, Godwin-Austen.

Austen's Parrot-billed Babbler.

Chleuasicus atrisuperciliaris, Godw. Aust., P. A. S. B., 1877, p. 147.

Suthora atrisuperciliaris, Oates, F. B. I., i., p. 67; Baker, J. A. S. B., viii, p. 167; *id.*, Ibis, 1895, p. 45.

Description as in Oates, F. B. I.

I have only been able to examine two very poor specimens of this subspecies, which appear to be very similar to *S. r. ruficeps*.

Dr. Hartert in a letter says: "I have restricted *ruficeps* to Sikhim, after examining *one* specimen only, and I have made *atrosuperciliaris* to occur in Cachar, Margherita, Sadiya, Ponsee (Yunnan Frontier) accepting that it differs from *S. ruficeps ruficeps*, by a small black spot above the eye, and quite rufescent cream under plumage.

Wing 70-74 mm. We have specimens from N. Cachar, Dibrugarh and Margherita (Assam).

Stuart Baker has taken the eggs of this bird, and he describes them as pale spotless blue.

Nesting: *see* Ibis, 1895, January, p. 45.

Psittiparus, Hellmayr, 1903.

The generic name *Sceorhynchus*, Oates is preoccupied, therefore the above most appropriate one has been given.

This genus differs from *Paradoxornis* in the shape of its bill, and in having its wing longer than its tail, and has the following characteristics. Tail shorter than wing, and not greatly graduated; wing short, rounded, the first four primaries graduated, the fifth longest; legs and feet stout and strong; nostrils completely hidden by feathers, rictal bristles well developed; no hair overhanging nostrils; bill from gape longer than it is deep at the base.

PSITTIPARUS RUFICEPS RUFICEPS, Blyth.

The Red-headed Parrot-billed Babbler.

Paradoxornis ruficeps, Blyth, J. A. S. B., xi, p. 177 (1842).
Suthora ruficeps, Sharpe, Cat. B. M., vii, p. 491.
Scæorhynchus ruficeps, Oates, F.B.I., i, p. 68; Hartert, Nov. Zool. i, p. 548.
Description as in Oates, F. B. I.
"Bill smaller, wing a little shorter, under-surface white tinged with brownish-buff along the sides of the body. Bill whitish horny (Elwes). Bill from forehead to tip in a straight line, 14 m.m., wing 84-86 m.m." (Hartert).
Distribution.—Sikhim and Butan, Dafla and Mishmi Hills, extending into the foot hills to Sadiya and Jeypur.

PSITTIPARUS RUFICEPS BAKERI, Hartert.

Baker's Parrot-billed Babbler.

Scæorhynchus r. bakeri, Hartert, Nov. Zool., vii, p. 545 (1900.)
Description.—Similar to *P. r. ruficeps*, Blyth. Differs in "bill longer, wing a little longer, under-surface tinged with brownish-buff all over. Maxilla of bill dark horn-brown (Baker). Bill from forehead to tip in a straight line, 16 m.m.; wing 90-95 m.m."
"The bill is not only longer, but is also higher and much thicker; its colour is darker in the skins. And the notes of the collectors on our labels agree as to this." (Hartert).
Distribution.—South of the Bramhaputra River, Assam, Cachar, Karennee and Tenasserim. Most probably also in the Chin and Bhamo Hills.

PSITTIPARUS GULARIS GULARIS, Horsfield.

The grey-headed Parrot-billed Babbler.

Paradoxornis gularis, Horsf. Gray's Gen. B. ii. p. 389. (1849).
Suthora gularis, Sharpe, Cat. B. M., vii, 492.
Scæorhynchus gularis, Oates, F. B. I., i, p. 69.
S. gularis gularis, Hartert, Nov. Zool., vii, p. 548.
Description as in Oates, F. B. I.
"Of medium size, under-plumage white; bill about 12-13 m.m.; wing 91-93 m.m." (Hartert).
Distribution.—Sikhim and Butan, the Mountain Ranges N. of the Brahmaputra as far as Sadiya.

* PSITTIPARUS GULARIS TRANSFLUVIALIS, Hartert.

Hartert's Parrot-billed Babbler.

Scæorhynchus gularis transfluvialis, Hartert, Nov. Zool., vii, p. 548 (1900).

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* P. GULARIS FORKIENSIS, David..
Hartert, Nov. Zool., vii, p. 548.
Distribution.—Fokien, China.

PSITTIPARUS GULARIS, HAINANUS, Rothschild.
Rothschild, Bull B. O. C., civ, p. 7. (1903).
Wing 84-87 m,m.
Hab.—Mt. Wuchi, Hainan.

Description.—Similar to *P. g. gularis* (Blyth). Differs in being " smaller ; bill less powerful ; under plumage more suffused with fulvous buff. Bill of the same length as that of *P. g. gularis*, but not so thick. Wing 86-89 m.m."

Distribution.—South of the Brahmaputra, Assam, Cachar, Khasia Hills, the Shan States and Karennee, and probably the intervening country.

† NEOSUTHORA, n. gen.

I propose the above generic name with *N. d. davidiana* (Slater) as type.

Differs from *Suthora* in having an extremely short tail, which is much shorter than wing : also a much thicker bill, which is as deep at the base as it is long from the gape. It is very similar to *Psittiparus* in structural characteristics, and differs chiefly in size. It will be most interesting to know what the eggs of this genus are like, whether they are spotless as in *Suthora*, or spotted as in *Psittiparus*.

NEOSUTHORA DAVIDIANA THOMPSONI, Bingham.

Bingham's Parrot-billed Babbler.

Suthora thompsoni, Bingham, Bull. B. O. C., xiii, p. 63, 1903.

Description.—Resembles *N. d. davidiana*, Slater, from Foh-kien ; but is distinctly smaller and differs in the points noted below: Forehead, crown, sides of the head and nape chestnut, of a much deeper colour than in *N. d. davidiana*, and not extending to the upper back ; along the posterior margin of the nape the chestnut colour gets somewhat paler; back, rump and wing coverts clear, rather dark, ash-grey ; wings brown, the quill feathers secondaries and tertiaries with the outer margins narrowly light chestnut ; upper tail-coverts and the outer web of the tail feathers above chestnut, of a lighter shade than the colour of the head ; inner web of the tail feathers brown ; chin and throat uniform deep-black, entirely without the white spots so conspicuous in *N. d. davidiana* ; upper breast albescent, remainder of the breast and flanks grey like the back ; abdomen, lower tail-coverts and tail beneath pale-ochraceous ; bill (in the skin) yellow, (in the flesh) " fleshy pink "; irides reddish brown : legs and feet " fleshy yellow " (Craddock).

Length : Female, 3·7—3·8 inches ; wing 2·1 ; tail 1·45 ; bill from gape 0·3 ; tarsus ·65.

Hab.—" Shot north-east of Kyatpyin village near the Paunglaung stream in Loilong State at 2,500 feet on 18th March 1902 " (Craddock).

Family—CRATEROPODIDÆ.

Oates, F. B. I., i., p. 71.

The *Crateropodidæ*, consist of two well marked Sub-Families. (1) *Crateropodinæ*. (2) *Pomatorhinæ* (the Laughing Thrushes and Babblers, and the Scimitar-Babblers.)

I have raised this section of the *Timeliides* to Family rank, it consists of two very distinct Sub-families, which are quite distinct in their characteristics, although they appear to grade from one into the other, through *Babax waddelli*, Dresser.

" The *Crateropodinæ* agree in being gregarious, extremely noisy, cautious but inquisitive and frequently bold. No birds can hide themselves better, but on the whole they do not shun observation as the *Timeliidæ*."—(Oates).

They are chiefly noticeable for their extremely large legs and feet ; their small rounded wings ; they are non-migratory and partly arboreal and partly territorial in their habits.

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† NEOSUTHORA DAVIDIANA DAVIDIANA, Slater.

Suthora davidiana, Slater ; Ibis. 1897, p. 172.

Hab.—N. W. Foh-kien, China.

The eggs of the *Crateropidinæ* form a very useful guide to their classification. Mr. Oates draws particular attention to this fact, and considered those laying spotted eggs might eventually have to be transferred either to the *Timeliinæ* or *Sibiinæ*. Since Mr. Oates wrote his valuable work, the nidification of the great majority of the Indian *Trochalopeterum* have become known. Those laying spotted eggs fall into a very natural group, which I think should be raised to the dignity of a genus. The colour of the eggs of the remainder is uniformly a spotless blue or white. The texture, however, appears to vary in different genera.

The *Crateropodinæ* fall into the following well marked groups, (1) The Laughing Thrushes, (2) Babblers (*Crateropus* and *Argya*), (3) *Babax*, (4) *Acanthoptila*, (5) *Garrulax cincereifrons*, Blyth, a form peculiar to the island of Ceylon, which appears to be the connecting link between the Laughing Thrushes and Babblers (*Garrulax* and *Crateropus*) whilst *Acanthopila* appears to connect *Argya* with *Babax*. So that we find these five groups, although having well marked features of their own, grading from one into the other. This grading of genera is one of the chief difficulties in the study of the *Timeliides*, and it is often very hard to say whether each group should be treated as one big genus, or sub-divided up into several.

I have, therefore, with the exception of the *Trochalopterum*, kept to Mr. Oates' classification. I wish however to draw attention to differences which exist in the following genera.

Garrulax.—I think that *G. leucolophus* and its geographical races should be separated from the other members of this genus, on account of their very ample crests.

Dryonastes.—These clearly fall into two groups, those having the bristles and hairs overhanging the nostrils more or less even, and with a delicately curved bill; and those having the bristles growing in coarse tufts, and having a stout straight bill.

Trochalopterum.—I have divided up this genus into two, a further subdivision, I think, should be made, separating the four Southern Indian birds from the rest, on account of their plain plumage, all the others having very highly coloured wings and upper plumage.

Argya longirostis.—I think this species should be placed in a genus by itself. It undoubtedly is very near *Argya*, but it has a much finer and longer bill than the other members of this group; its eggs also, although being blue, are not the rich turquoise blue of *Argya* and *Crateropus*.

Group 1.

Laughing Thrushes.

Have the following characteristics, bill shorter than the head, and not strikingly curved, tail generally longer than the wing, and greatly graduated: the feathers of the forehead with shafts lengthened; and the nostrils more or less overhung with bristles or long hairs.

The Laughing Thrushes as a whole are a well marked group consisting of several distinct genera; whether these should be further subdivided it is very hard to say.

Group 2.

Crateropus and Argya. (Babblers.)

Bill shorter than the head, stout and not greatly curved. The posterior half of the covering membrane of nostril clothed with plumes, which are continued back to the forehead, the feathers of which are short and rounded and no hairs overhanging the nostrils, plumage dull and either plain or striated.

Group 3.

Babax.

Bill slightly curved, not notched, and equal to or longer than the hind-toe and claw in length: tail longer than the wing, and considerably graduated; wing rounded, the first four primaries graduated, the fifth longest, sixth equal to the fourth: rictal bristles very pronounced; nostrils oval, exposed, and overhung with numerous hairs: size medium; upper plumage streaked, eggs spotless blue, and approaching *Argya* in coloration.

Group 4.

Acanthoptila.

"Bill moderately long, compressed, very gently curved, pointed, entire; rectal bristles few and small, wing feeble, much rounded; tail long and broad; tarsus moderately long, stout, lateral toes nearly equal; claws moderately curved; plumage with black and shining shafts."—(Jerdon B. I., ii., p. 57.)

Group 5.

Garrulax cinereifrons (Blyth.).

This bird is peculiar to Ceylon and I think should be placed in a genus by itself. Oates places it amongst the *Crateropus*, whilst other writers refer it to the Laughing Thrushes (*Garrulax*). It is certainly much nearer the latter in the description of its plumage. Oates points out that his reasons for placing it amongst the Babblers, is that the feathers of its forehead are rounded and approach *Crateropus* in which he placed it. Its eggs, I believe, have not yet been authenticated, but Mr. Stuart Baker informs me that they are possibly white; if this is the case, it is at once sufficient to remove it from amongst the Babblers, whose eggs are uniformly a rich verditer-blue.

Key.

A.—Bill straight, or not strikingly curved, and less than hind-toe and claw in length.
- *a.* Covering membrane of nostrils bare: frontal feathers with shafts or webs lengthened.
  - a^1. Nostrils nearly hidden by a profusion of bristles and hairs springing from the forehead .. .. *Dryonastes.*
  - b^1. Nostrils clearly visible but overhung with numerous bristles .. .. .. *Garrulax.*
  - c^1. Nostrils not overhung with bristles, but merely by a few long and fine hairs.
    - a^2. The feathers of upper plumage not stiff shafted.
      - a^3. Secondaries tipped white .. *Ianthocincla.*
      - b^3. Secondaries not tipped white.
        - a^4. Bill slender, upper plumage plain .. .. *Stactocichla.*
        - b^4. Bill stout, upper plumage striated .. .. .. *Grammatoptila.*
    - b^2. The feathers of upper plumage stiff shafted.. .. .. .. *Acanthoptila.*
  - d^1. Nostrils perfectly free and exposed, and not overhung with hairs or bristles. *Trochalopterum.*

b. Covering membrane of nostril bare, frontal feathers short and rounded .. .. .. *Garrulax cinereifrons.*

c. Posterior half of covering membrane of the nostrils clothed with plumelets continued back to the forehead, the feathers of which are short and rounded.

e[1]. Tail very much longer than the wing... *Argya.*

f[1]. Wing and tail almost equal in length.. *Crateropus.*

B.—Bill curved, equal to or slightly longer than hind-toe and claw (upper plumage streaked) .. *Babax.*

Group 1. *Laughing Thrushes.*

Dryonastes (Sharpe) 1883.

Oates, F. B. I. i., p. 72.

"The genus *Dryonastes* of which *D. ruficollis* (Jardine) is the type contains those Laughing Thrushes which have the nostrils almost completely hidden by bristles. They are very closely allied to some of the *Corvidæ* in structure and they might almost be placed in the same family. They differ, however, in laying spotless eggs and in their habits."—(Oates.)

They have the following characteristics, a rounded wing: tail and wing almost equal; nostrils pierced and almost hidden by overhanging hairs and bristles.

All lay spotless eggs, pale blue or white.

Key, as in Oates F. B. I.

Dryonastes fall into two sub-groups, chiefly noticeable for the amount of bristles.

I. *Sub-Group*—Type D. ruficollis (Jardine).

Having the feathers at the base of the forehead and bill a stiff mass of bristles: the bill small, narrow and gently curved: the wing with the first four primaries graduated and the 5th and 6th equal and longest. This sub-group consists of the following Indian species.

D. ruficollis, *D. sannio*, and *D. galbanus*, the bristles at the base of the bill of this last species form almost a smooth velvety mass.

II. *Sub-group*.—Type D. c. cærulatus (Hodgson).

The feathers at the base of the forehead and at the base of the bill growing in irregular tufts: the bill rather long, stout and almost straight, and the first five primaries graduated. This sub-group consists of the following Indian species *D. cærulatus*, *D. chinensis* and *D. nuchalis*.

The numbers of both sub-groups lay spotless blue or white eggs, the texture of which in each group is quite distinct. In the first highly glossy and close. In the second satiny and not very glossy.

Dryonastes ruficollis (Jardine).

The Rufous-necked Laughing Thrush.

Ianthocincla ruficollis, Jard. and Selby, Ill. Orn. 2nd series, pl. 21. (1838).

Dryonastes ruficollis, Sharpe, Cat. B. M. VII, p. 454: Oates, F. B. I., i., p. 73.

Description as in Oates, F. B. I.

Distribution.—Only found at low elevations in the Himalayas from Nepal to Assam, Manipur and Northern Burma, in the Upper Chindwin, Myitkyina and Bhamo Districts in the plains.

Dryonastes sannio (Swinhoe).

The White-browed Laughing Thrush.

Garrulax sannio, Swinhoe, Ibis. 1867, p. 403.
Dryonastes sannio, Sharpe, Cat. B. M. VII, p. 459 ; Oates, F. B. I. i., p. 76.
Description as in Oates, F. B. I.
Distribution.—Manipur, the hills on the eastern borders of Burma, where it is the common Laughing Thrush, above 3,500 ft., and from the Bhamo Hills to the Shan States and extending to S. China. Its eggs have often now been described and are remarkable for their variation in colour from pale blue to white.

Dryonastes galbanus (Godwin-Austin).

Austen's Laughing Thrush.

Garrulax galbanus, Godn-Aust., P. Z. S., 1874, p. 44 ; Sharpe, Cat. B. M. VII, p. 445.
Dryonastes galbanus, Oates, F. B. I. i, p. 76.
Description, etc., as in Oates, F. B. I.
Distribution.—The Manipur and Chin Hills.
[The nest and eggs have recently been taken by Mr. C. Hopwood in the Chin Hills. He describes both as being similar to those of *D. ruficollis* and in a letter to me he gives the dimensions as being 1·06″×·76″.
With the exception of a single nest taken by myself in N. Cachar many years ago, this is I believe the first recorded nest and eggs of this species. My eggs are practically indistinguishable from those of *ruficollis* though they measure somewhat over the average of this bird's eggs.—E. C. S. B.]

Dryonastes cærulatus.

The Grey-sided Laughing Thrush.

Consists of three geographical races which extend from Nepal to Assam north of the Brahmaputra river (*D. c. cærulatus* (Hodgson). The Khasia Hills have their own race in *D. c. subcærulatus* (Hume), which possibly may extend to the Chin Hills. This sub-species differs from the first in having its tail feathers tipped with white. In the Bhamo hills, *D. c. kauriensis* (Rippon), is the local representative, this has the tail tipped with white, and the ear-coverts brown instead of white.

Dryonastes c. cærulatus (Hodgson).

The Nepal Grey-sided Laughing Thrush.

Cinclosoma cærulatus, Hodgson, As. Res. XIX, p. 147, (1836).
Dryonastes cærulatus, Sharpe, Cat. B. M. VII., p. 461 ; Oates, F. B. I., i., p. 75.
Description, etc., as in Oates, F. B. I.
Distribution.—Nepal and Sikhim, Dibrugarh, Assam.

Dryonastes cærulatus subcærulatus (Hume).

The Shillong Laughing Thrush.

Garrulax subcœrulatus, Hume, S. F. VII., p. 140 (1878).
Dryonastes subcærulatus, Sharpe, Cat. B. M. VII, p. 462 ; Oates, F. B. I., i., p. 76.
Description as in Oates, F. B. I.

Distribution.—Confined to the Khasia Hills.

[The nest is similar to that of *D. rufiollis*, but is a larger more bulky nest and is generally deeper also in proportion to its breadth. It is composed of small pliant twigs and weed stems, leaves, grasses, rootlets and sometimes a few leaves. The lining is of fine grasses and roots generally almost black in tint. The most common site is a thin straggling bush in which it is placed in some fork three to six feet from the ground but often it is placed in tangles of brambles, blackberries, or raspberries within a foot or so of the ground. On one or two occasions it has been taken from small saplings as high up as 12 feet.

The eggs are generally two only in number, very rarely three and still more rarely four, and are in general character about half way between the eggs of the genus *Garrulax* (*monilger*, etc.,) and the intensely glossy ones of the typical *Dryonastes* such as *sinensis*. The surface is very smooth and glossy, but is not so hard and shiny as that of the last mentioned bird, the texture is very fine and close and the shell rather fragile. In colour they are a pale but brilliant green-blue and when freshly taken are most distinctive in tint, but after a year or two are hardly distinguishable from pale, highly glossed eggs of other birds of this group, though darker than any but those of *cærulatus*.

In length they very likewise 1·24" and 1·30" and in breadth between ·79" and ·86", the average of 14 being 1·32" × ·82".—E. C. S. B.]

Dryonastes cærulatus kaurensis, Rippon.

The Kachin Hills Laughing Thrush.

Rippon, B. B. O. C. XII., p. 13. (1902): Harington, B. N. H. S. J. XIX., p. 111. *id. Ibis.* 1914, p. 7.

Description.—Similar to *D. c. subcærulatus*, Hume, differs in having the ear-coverts rufescent-brown, instead of white. The tail is tipped with white as in that species.

Distribution.—The Bhamo Hills above 5,000 feet.

Nesting.—The nest is of the usual type, the eggs pale blue, measuring 1·16 × ·84 inches.

Dryonastes chinensis (Scop.).

The Black-throated Laughing Thrush.

Lanius chinensis, Scop, Del. Fl. et Faun. Insubr. ii, p. 86 (1786).
Dryonastes chinensis, Sharpe, Cat. B. M. VII, p. 453, Oates, F. B. I., i, p. 74; Harington, J. B. N. H. S., XIV., p. 597.
Description as in Oates, F. B. I.

Distribution.—The Southern Shan States and Karennee to Tenasserim and S. Pegu, and extending into China. It has lately been procured in the Northern Shan States by Mr. J. P. Cook.

I described the eggs of this species in the Journal, Vol. XIV, p. 597, but as I did not obtain the parent bird, I am afraid I am not quite certain as to their identification. Although such a well-known species as a cage bird, I can find nothing else recorded as to its identification.

Dryonastes nuchalis (Godwin-Austen).

Ogle's Laughing Thrush.

Garrulax nuchalis, God.-Aust. A. M. N. H. (4) XVIII. p. 411, (1876).
Dryonastes nuchalis, Sharpe, Cat. B. M. VII. p. 456; Oates, F. B. I., i, p. 74; Baker, *Ibis* 1906, p. 89.
Description as in Oates, F.B.I.

Distribution and habitat—
For Breeding notes see "Ibis" Jan. 1888, p. 62.

Note.—This is the same type of bird as *D. chinensis*, only differing from it in having a chestnut collar, and in most likely only a geographical race of that species. I should not be surprised if a connecting link was found in the Chin Hills.

Garrulax, Lesson.

Type—G. leucolophus, Lesson.

Oates, F. B. I. i., p. 77.

"*The genus Garrulax differs from Argya in having lower tarsi and bare covering the nostrils, the culmen being so reduced that the nostrils are clearly visible. The species of Garrulax are on the whole much larger birds, and some of them have very ample crests*"—(*Oates*).

This genus falls into two natural groups and I think should be subdivided: (I) Those having a large ample crest as *G. leucolophus belangeri*, and such which are only geographical races of the first species, and (II) The remainder which have no real crest. Both groups have the following characteristics. The usual round wing, with the first four primaries graduated; wing and tail about equal in length, rictrils oval, exposed and overhung by a few hairs. The first group lay white eggs, the second both white and blue.

The texture of the eggs of the two groups is absolutely different, that of the egg of the crested *leucolophus* group is intensely hard and glossy, the surface pitted and the shell unusually stout. That of the *nuchalis* group have the surface fine and smooth, not at all glossy and never pitted, and the shell is not nearly so stout. In shape also they differ, the eggs of the former group being very round and blunt, whilst those of the latter are generally long and pointed. *Garrulax delesserti* appears to be a connecting link between the two genus.—E. C. S. B.]

Garrulax leucolophus leucolophus (Hardwick).

The Himalayan White-crested Laughing Thrush.

Corvus leucolophus, Hardw. Trans. Linn. Soc. XI. p. 209 (1815).
Garrulax leucolophus, Sharpe, Cat. B. M. VII. p. 17, p. 481; Oates, F. B. I. i, p. 77.
Description, etc., as in Oates, F. B. I.
Distribution.—From Garwal in the Himalayas to the extreme east of Assam, the Chin Hills, and Cherrapunji on the west of Burma. Western and the Bhamo Hills, the exact distribution on the east and west of Burma not yet determined, probably restricted to the north of the "Dry-Zone" of Burma.

Garrulax leucolophus belangeri. Lesson.

The Burmese White-crested Laughing Thrush.

Lesson, Tr. d'Orn. p. 345 (1831); Sharpe, Cat. B. M. VII., p. 480; Oates, F. B. I., i p. 79.
Description as in Oates, F. B. I.
Distribution.—The Hills of Lower Burma and Tenasserim, the Southern Shan States, the exact locality where this species meets the last, both on the eastern and western sides of Burma, has not yet been established.

It differs from *G. l. leucolophus*, in having its under plumage rufous instead of olive-brown, and is a smaller bird than *G. l. diardi*.

[The nest and eggs, of which I have many, cannot be distinguished from those of *leucolophus*.—E.C.S.B.]

Garrulax leucolophus diardi (Lesson).*

The Siamese Laughing Thrush.

Turdus diardi, Less. Tr. d'Orn. p. 408 (1831).
Garrulax diardi, Sharpe, Cat. B. M. VII. p. 437; Oates, F. B. I. i. p. 79.
Description as in Oates, F. B. I.
Distribution.—Siam, Cambodia and within Indian limits, cis-Salween Maukmai, S. S. States, and the frontier range between Tenasserim and Siam.

[The nest is exactly like the nest of the two preceding birds, but the eggs average a trifle larger—E. C. S. B.]

Garrulax pectoralis (Gould).

The Black-gorgeted Laughing Thrush.

Ianthocincla pectoralis, Gould, P. Z. S. 1835, p. 186.
Garrulax pectoralis, Sharpe, Cat. B. M., VII., p. 441; Oates, F. B. I. i., p. 80.
Description as in Oates, F. B. I.

Mr. Oates draws attention to the variation in the colour of the ear-covert, these may vary from black to almost pure white in birds from the same locality. The only variation that seems to hold good, is that of the Tenasserim birds which have buff-coloured tips to the tail feathers, those from the Himalayas and other localities have the tails tipped with white.

Distribution.—From Nepal to Assam, thence through Burma to Tenasserim.

Garrulax waddelli, O. Grant, Bull, B. O. C., III, p. 29 (1894) and Blanford App. Vol. IV, F. B. I., p. 478.†

There is only one specimen of this so-called sub-species from Sikhim, where *G. pectoralis* also occurs, and is in all probability a case of individual variation.

Garrulax moniliger (Hodgson).

The Necklaced Laughing Thrush.

Cinclosma moniligera, Hodgson, As. Res. XIX., p. 147 (1836).
Garrulax moniliger, Sharpe, Cat. B. M. VII., p. 442; Oates, F. B. I. i., p. 81.
Description as in Oates, F. B. I.

Distribution.—Practically the same as *G. pectoralis*. Both these species are found at low-elevations, and consort together in parties, and although so very alike are quite distinct, and easily separable by size.

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* *Allied sub-species.*
G. bicolor, Hartl. From Sumatra.
Very noticeable for its rich almost chocolate colour, it however belongs to this group of the Laughing Thrushes with a noticeable white crest.

† *Allied sub-species* are—
G. picticollis, Swinhoe, P. Z. S., 1872, p. 554. From Foh-kien and the Yangtze Valley, China.
S. semitorquatus, O. Grant, B. B. O. C., l. c. p. 49, (1900). From Hainan.

Garrulax gularis (McClelland).

McClelland's Laughing Thrush.

Ianthocincla gularis, McClell., P. Z. S., 1839, p. 159.
Garrulax gularis, Sharpe, Cat. B. M., VII., p. 445; Oates, F.B.I,i.,p. 82; Baker, *Ibis* 1895, p. 46.
Description as in Oates, F. B. I.
Distribution.—Assam.
Nesting—Stuart Baker says that this species breeds during April to July in the hills north-east of Cachar. It appears to build the usual type of nest, and lays two, rarely three, eggs. These are either pure white, or pale blue, intermediate shades rarer, and vary from 1·75 to 1·22 in length, and 0·75 to 0·85 in breadth. Average being 1·15″×·80″.

Garrulax delesserti (Jerdon).

The Wynaad Laughing Thrush.

Crateropus delesserti, Jerdon, Madras Journ. L. S. X, p. 356 (1839).
Garrulax delesserti, Sharpe, Cat. B. M., VII., p. 446; Oates, F. B. I., i, p. 82; Baker, *Ibis* 1906, p. 90.
Description as in Oates, F. B. I.
Distribution.—The Hills of S. India.
Nesting—See *Ibis* 1906, p. 90.
[The eggs are always white and never blue. I have a very fine series of these eggs which I owe to the generosity of Mr. J. Stuart of Travancore. The nest he describes as a bulky deep cup, sometimes almost semi domed, sometimes hardly bigger or stouter than that of *Molpastes*. The eggs, two or three in number, are pure white miniatures of those of *Garrulax leucolophus*, but are not pitted on the surface or only *very* slightly so, are finer and softer in texture and closer grained. They average about 1·05″×·80″. A few eggs may be met with more or less pointed in shape but normally they are broad obtuse ovals—E. C. S. B.]

Garrulax albigularis (Gould).

The White-throated Laughing Thrush.

Ianthocincla albogularis, Gould, P. Z. S., 1835, p. 187.
Garrulax albogularis, Sharpe, Cat. B. M., VII., p. 439; Oates, F. B. I. i., p. 82.
Description as in Oates, F. B. I.
Distribution.—North-West Himalayas and Sikhim. As mentioned by Oates, birds from Sikhim and to the North-East are much brighter coloured: also birds from the North-West appear to have a very much shorter and stouter bill, which might be considered sufficient to constitute a well-marked geographical race.

Garrulax strepitans (Tickell.).

Tickell's Laughing Thrush.

Blyth, J. A. S. B., XXIV, p. 268. (1855).
Dryonastes strepitans, Sharpe, Cat. B. M., VII., p. 457.
Garrulax strepitans, Oates, F. B. I. i., p. 83.
Description as in Oates, F. B. I.
Distribution.—So far has been only obtained on Muleyit Mt., Tenasserim. Nothing appears to be known of its nidification, or the colour of its eggs.

IANTHOCINCLA, Gould. 1835.

Type I. ocellata (Vigors).

Oates, F. B. I., i., p. 84.

"I apply the generic term *Ianthocincla* to those Laughing Thrushes which have no bristles at the base of the forehead; but in which the nostrils are overhung by a few long hairs. This genus differs in no other respect from *Dryonastes* and *Garrulax*. All the species are remarkable in having the secondaries tipped with white."—(Oates).

Ianthocincla have a rather narrow bill; the nostrils oval, and exposed, and overhung with numerous long hairs; the first five primaries are graduated; and the tail slightly longer than the wing.

* IANTHOCINCLA OCELLATA (Vigors).

The White-spotted Laughing Thrush.

Cinclosoma ocellatum, Vigors, P. Z. S., 1831, p. 55.
Ianthocincla ocellata, Sharpe, Cat. B. M., VII, p. 382; Oates, F. B. I., i., p. 84.
Description as in Oates, F. B. I.
Distribution.—Nepal and Sikhim.

IANTHOCINCLA CINERACEA (Godwin-Austen.)†

The Ashy Laughing Thrush.

Trochalopterum cineraceum, Godwin-Austen, P. Z. S., 1874, p. 45; Sharpe Cat. B. M., F. B. I., i, p. 366.
Ianthocincla cineracea, Oates, F. B. I., i, p. 85.
Description as in Oates, F. B. I.
Distribution.—E. Manipur, Naga and Chin Hills to Mt. Victoria.

[I have eggs of this species from Colonel Tytler which I believe to be quite well authenticated. In colour these are pale blue-green and in shape and texture similar to the eggs of *Trochalopterum virgatum* and *lineatum* from which they could not well be distinguished. They measure on an average ·98″ × ·72″. Colonel Tytler was good enough to send me nests, eggs and birds from the Naga Hills where he took a considerable number at an elevation between 4,000 and 6,000 feet.—E.C.S.B.]

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* *Allied sub-species—*
I. ocellata maxima. (J. Verr.) N. Arch. Mus. VI. Bull. p. 36 (1870).
Distribution.—Monpin, S. Kansu, and W. Szechuen, China.
I. ocellata bieti, Oustalet, Bull. Mus. Paris. VII, p. 163 (1897).
Distribution.—Upper Mekong.
I. ocellata artemisæ, (David) Ann. and Mag. Nat. Hist (4)VII, p. 256 (1871).
Distribution.—Szechuen and S. Kansu, China.
I. ocellata lunata, J. Verr. Nouv. Arch. Mus. VI. p. 36 (1870).
Distribution.—W. Szechuen, Monpin and S. Kansu, China.

† *Ianthocincla cineracea cinereiceps*, Styan, Ibis. 87 p. 167, 1887.
Similar to *I. c. cineracea*, Godwin-Austin, differs in having the cap greyish to blackish; the ear-coverts white; upper plumage tinged with brown; breast tinged with vinous pink.
Distribution.—Szechuen, and Foh-kien, China.

[The only egg I have seen of this species is one I obtained from the Styan collection. It was taken at Kuatun in 1895 and is somewhat faded and discoloured and it could hardly now be distinguished from eggs of *Garrulax moniliger*. It measures 1·10″ × ·88″ and is a rather long narrow egg.—E. C. S. B.]
Ianthocincla cineracea styani, Oustalet, Bull. Muss. Paris, (1898). No. 6, p. 226.
Distribution.—Yunnan.

IANTHOCINCLA RUFIGULARIS RUFIGULARIS, Gould.

The rufous-chinned Laughing Thrush.

Ianthocincla rufigularis, Gould, P.Z.S., 1835, p. 48; Oates, F. B. I,i., p. 86; Harter, Pal., Vog i., p. 634.

Trochilopterum rufigulare, Sharpe, Cat. B. M., VII, p. 365.

Description as in Oates, F. B. I. where Mr. Oates points out the differences between the birds of various localities.

Distribution—The Central Himalayas, Nepal and Sikhim.

IANTHOCINCLA RUFIGULARIS ASSAMENSIS, Hartert.

Hartert's Laughing Thrush.

Hartert Pal., Vog. i., p. 635. (1910.)

Differs from *I. r. rufigularis*, in having the whole throat rusty red for about one inch. The size is also smaller ; and ear-coverts brown.

Bill 2 m.m. shorter, Wing 91-94 m.m.

Distribution.—The Patkoi, Khasia and Garo Hills, Assam.

Nesting.—[The nest and eggs do not differ from those of the Nepal Bird. This form was very common in N. Cachar and I took many nests and eggs. A large series of the latter average 1·12″×·80″ and are pure white of a rather dull texture, seldom showing any gloss.—E. C. S. B.]

IANTHOCINCLA RUFIGULARIS OCCIDENTALIS, Hartert.

The Kashmir Laughing Thrush.

Hartert, Pal., Vog. i., p. 635. (1910.)

Similar to *I. r. rufigularis*, but has the upper plumage paler, and ear-coverts rusty orange.

Distribution.—North-West Himalayas, from Kumaon to Kashmir.

IANTHOCINCLA AUSTENI AUSTENI (Jerdon).

The Cachar Laughing Thrush.

Trochalopterum austeni, Godwin-Austen, J. A. S. B. XXXIX pt. II, p 105 (1870); Sharpe, Cat. B. M. VII, p. 369.

Ianthocincla austeni, Oates, F. B. I., i., p. 87.

Description as in Oates, F. B. I.

Distribution.—Khasia and Cachar Hills, Assam.

Nesting.—[The nest and eggs are similar to those of *I. rufigularis* but the eggs are a trifle smaller on an average being about 1·08″×·78″.—E. C. S. B.]

IANTHOCINCLA AUSTENI VICTORIÆ (Rippon).

The Chin Hills Laughing Thrush.

Rippon, Bul. B. O. C. XVI., p. 47, (1906.)

Similar to *I. a. austeni* (Jerdon). Differs in having the under parts much whiter, the feathers from the chin to abdomen having broad white edges.

Habitat.—The Chin Hills on the west of Burma.

STACTOCICHLA (Sharpe), 1883.

Oates, F. B. I. i., p. 104.

This genus consists of only one bird characterised by its long straight bill, and long rictal bristles and its very thrush-like spotted breast.

STACTOCICHLA MERULINA (Blyth).
The Spotted-breasted Laughing Thrush.

Garrulax merulinus, Blyth, J. A. S. B. XX., p. 521. (1851.)
Stactocichla merulina, Sharpe, Cat. B. M. VII., p. 449; Oates, F. B. I., i., p. 104.

Description and Distribution as in Oates, F. B. I.

Nesting.—Stuart Baker says it breeds all over the N. Cachar and Manipur hills above 3,000 ft. Building a compact shallow cup, and lays from 2 to 3 eggs. These are a beautiful blue-green, similar in colour to eggs of *G. moniliger*, but with a totally different texture. In shape broad ovals which average 1·18″×·83″ to 1·14″×·82″.

GRAMMATOPTILA (Reichenb.), 1850.

Oates, F. B. I., i., p. 102.

"The two birds of this genus may be recognised by their stout, short, deep bill, striated plumage, and by the long frontal hairs which reach over the nostrils."—(Oates).

KEY TO SUB-SPECIES.

(*a*) Feathers of crest *streaked* with white, no brown band on the sides of the head .. .. .. *G. striata striata.*
(*b*) Feathers of crest *not streaked* with white, a brown band on the sides of the head .. .. .. *G. striata austeni.*

GRAMMATOPTILA STRIATA STRIATA (Vigors), 1830.

The Striated Laughing Thrush
and
GRAMMATOPTILA STRIATA AUSTENI (Oates), 1889.
Austen's Striated Laughing Thrush.

Description and Distribution as in Oates, F. B. I.

It appears to be doubtful whether this species lays spotted eggs or not. Mr. Stuart Baker says he has never seen any spotted eggs of this species.

[The nest and eggs of *austeni* do not differ in any way from those of *striata*. The breeding season is April and May in the Khasia Hills.—E. C. S. B.]

GARRULAX CINEREIFRONS, Blyth.

This species which is peculiar to the Island of Ceylon, is quite distinct from any other Laughing Thrushes in having the feathers of the forehead rounded and short, and for this reason was placed by Oates in *Crateropus*. In style of plumage it is Garrulacine, and approaches *G. delesserti* in coloration, and I consider it should be placed in a sub-genus by itself. I have carefully examined all the numerous "Laughing Thrushes" from the Oriental region and can find none approaching it.

Its characteristics are, a slighty curved bill with oval exposed nostrils, with no overhanging hairs or bristles; and the feathers of the forehead, short and rounded.

GARRULAX CINEREIFRONS, Blyth.
The Ashy-headed Laughing Thrush.

Garrulax cinereifrons, Blyth, J. A. S. B. XX., p. 176 (1851); Sharpe, Cat. B. M. VII., p. 447.
Cratheropus cinereifrons, Oates, F. B. I. i., p. 114.
Description as in Oates, F. B. I.
Distribution.—The Island of Ceylon. Nothing appears to be known about the nesting or habits of this species [though the eggs have been described as white, a most unlikely colour for them to be if the bird is considered a *Crateropus*.—E. C. S. B.]

(To be continued.)

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

(INCLUDING THOSE MET WITH IN THE HILL STATIONS OF THE BOMBAY PRESIDENCY).

BY

T. R. Bell, I.F.S.

(*Continued from page* 531 *of Volume XXII.*)

Part XVI.

Genus—Colotis.

This genus is Ethiopian and Indo-Malayan in distribution; in the limits of British India seven good species are recognized besides some not very well-defined races. The colours of the members of the genus are characteristic: salmon or white, always with a diagonal black bar across the apex of the forewing outside which, in the white species, there is a red or yellow patch. The black bar may be obsolescent, especially in the dry-season specimens, but is always indicated; the red or yellow patch may be faded to white in some females. All species are plentiful in the Plains though *protractus* is somewhat local and seemingly confined to Baluchistan, Sind, the Punjab and Cutch. None are found ordinarily in mountainous tracts, in heavy forest regions where the rainfall is abundant; they want plenty of sun, open country and, perhaps, not too much moisture in the air. However, the distribution probably altogether depends upon the absence or presence of the food plants of the caterpillars.

116. Colotis amata.—(Pl. J., fig. 68.)—Male, *upperside*, salmon-pink. Forewing; costa black, thickly overlaid with greyish or pinkish scales, a black spot at apex of cell which may be large and quadrate or smaller and lunate; termen broadly black with an enclosed, double series of spots of the ground-colour—the inner series consists of a large spot in interspace 1, two very small spots in interspaces 2 and 3, one in each, and four larger, anterior spots placed in a curve; the spots in the outer series are variable in number but, generally, there is one in each interspace, these are more or less linear in shape. Hindwing: a band on costal margin extended to just within the upper margin of cell, covered with dense, black, specialized scales; this band joined on to a broad, similarly-coloured, terminal band of ordinary scales, that becomes more or less diffuse and powdery posteriorly and encloses a double series of small spots of the ground-colour, the inner series often obsolescent; in some specimens entirely absent; dorsum heavily irrorated with fuscous scales, the irroration extended on to the disc which has, therefore, a greyish appearance. *Underside*: greenish yellow; an anteciliary, fine, black line on both fore and hindwings; the black markings of the upperside show through by transparency. Forewing: a black spot, variable in size and intensity, in some specimens absent altogether, at apex of cell; a subterminal, quadrate, black spot in interspace 1 and another (sometimes faint or absent) further outwards in interspace 2; disc faintly, dorsal margin broadly, pale salmon-pink. Hindwing: the whole surface sparsely irrorated with minute, black scales; a small, black, discocellular spot. Cilia of both wings pale salmon-pink. Antennæ, head, thorax and abdomen black, the

antennæ speckled with white, the head and thorax covered with greenish-fuscous hairs; beneath: the palpi green, thorax and abdomen white. Female dimorphic. *1st Form, upperside*: ground-colour paler than in the male, in some specimens quite whitish externally; all the markings similar but duller in tint; the hindwing of course without the black, costal band of specialised scales, the ground-colour extended up to the costal margin. *Underside*: similar to that of the male but the ground-colour very much paler and more whitish-grey than green. In some specimens, in addition to the black spots in interspaces 1 and 2 on the forewing, there is an anterior, postdiscal, fuscous, curved band. Hindwing: discocellular spot larger than in the male and annular; a curved, discal series of reddish or pale ferruginous spots from costa to dorsum. *2nd Form*: similar to Form 1 but the ground-colour pale primrose-yellow to pure white. Antennæ, head, thorax and abdomen in both forms as in the male. Expanse 40–50mm.

Egg.—In shape it is a truncated cone, twice as high, or slightly more, as broad, with longitudinal channels and fine, transverse striæ; colour white at first, turning yellow later on.

Larva.—When it emerges from the egg it is nearly quite cylindrical with a shiny, black, smooth head covered sparsely with white, erect hairs; the body is light greenish yellow-brown, rather oily looking, with a row of tubercular hairs along front margin of each segment; there are no points at end of anal segments.

2nd stage.—The same but the clypeus light in colour; the body now with many extra smaller hairs all over except on segments 2, 3.

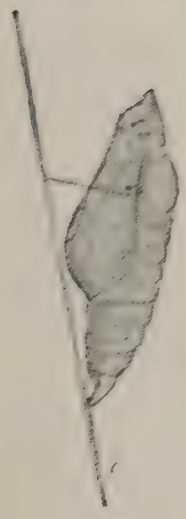
3rd stage.—Head generally green, sometimes marked with brown, with white, erect hairs from tubercles; eyes brown. Body oily green, covered with short, light-coloured, bristle-like hairs with no sign of tubercles; along front margin of segment 2 is a row of 8 erect hairs, each one bearing a globule of dark brown liquid at its extremity and rising from small tubercles which are the same colour as the body; segment 3 has 6 similar hairs across the middle (transversely to the length of the body); the others have 8, one subdorsal, one dorsolateral, supraspiracular and subspiracular on each side; the anal segment is rounded at end, very slightly indented in middle of hinder margin; there is a commencement of a dorsal, white band on anterior segments (often a complete one the whole length of larva) and an obsolescent, spiracular, white line.

4th stage.—Head green; body green also but no longer oily looking, the rest the same as in the 3rd stage.

5th stage.—The caterpillar is of the same shape as that of *Chilasa* *zeuxidia*. It has the same round head, the large triangular clypeus has somewhat outward-curved lateral sides and is green, covered with very minute, cylindrical, white tubercles in the same way except that here the tubercles are at a distance of at least three, perhaps four tubercle-diameters one from the other and the hair on each is dark brown, fairly long and erect, hardly pointing down at all; the eyes are white-glassy, marked with brown; the jaws are brown-tipped; the labrum, ligula, antennal joints are green. The spiracles are oval, of ordinary size, light brownish, those of segments 2 and 12 hardly larger than the rest. *The surface of* the body is lined transversely with the usual 7 lines to each segment and each ridge thus formed is set with minute white tubercles like the head, spaced similarly and bearing exactly similar dark hairs, one transverse (to body, along each ridge) along centre of each ridge: the main subdorsal, dorsolateral and supraspiracular tubercle no larger than the rest, the hair on each, however, slightly longer, blunt-ended and generally bearing a drop of dark liquid; the hairs in spiracular-ventral region fine, white and some of them somewhat longer. The anal flap is trapeze-shaped, square-ended and rather thick, the square end being ever so

gently concave. The colour is a fine rich grass-green, rather bright, with a broad, white dorsal line generally showing the transverse lines of the segments (the 7) as slight depressions throughout its length; this dorsal line often reaches from the anterior margin of segment 2 to the anal flap, sometimes it is more or less indistinct but generally present on the first few segments; there is, besides, sometimes, a fine light, very thin, spiracular line; the belly is light glaucous-green as well as the prolegs; the feet are the same with brown hooklets; the true legs are shiny light greenish. L: 20mm; B: 3mm.

Pupa.—(*c.* marginal figure).—The chrysalis is of the *Terias* type with wings ventrally prominently bulged out in a curve along their suture-line, the thorax humped, the head produced into a "beak" in front, the abdomen circular in transverse section from end of wings, thinning in segments 10 to end. Here the ventral bulge of the wing-suture line is not very accentuated, the apex of the curve being situated at about $\frac{2}{3}$ its total length from front end of pupa to the front margin of segment 9, where it ends; the beak is conical, equilateral, its base being reckoned as the whole pupal diameter at front margin of segment 2; the real beak is only the very extremity of this cone and it is very short; segment 2 is about half the length of this cone, has its surface parallel to the pupal longitudinal axis, its front margin dorsally curved concavely and gently backwards, the hinder margin curved gently forwards towards it; the thorax is twice the length of segment 2, only gently "humped," has its surface (taken as the plane subtending the hump-curve) parallel to pupal axis and its hinder margin a gentle curve meeting the wings in a shallow, sharp angle considerably less than 90°; the lateral outline is nearly absolutely parallel from shoulders to segment 8, these lines converge gently from shoulders to eyes, then meet in the beak; the wings are thus only slightly expanded laterally; the cremaster is nearly square, gently concave at end, depressed dorsally between little-prominent, subdorsal ridges, slightly depressed ventrally between the rounded marginal ridges, each hardly-prominent extensor-ridge ending in a little point or sharp tooth anteriorly; the suspensory hooklets are arranged in a dense mass all along the posterior margin. *Spiracle* of segment 2 a mere linear indication, the others white, oval, of usual size, flush. *Surface* of pupa finely aciculate-corrugated all over, somewhat punctate on abdomen. Colour green with the lateral outline along wings yellow; there is always a black spot on the discocellulars and the black spots at end of veins of hindwing show through indistinctly. L: 16 mm; B: 3·5 mm. Depth at apex of wing-curve: 4 mm.



× 2.

Habits.—The eggs are laid on the upperside of the leaf, from 50 to 60 in a batch, each egg separate and without apparent order. The larvæ are gregarious throughout their existence, eat voraciously and grow extremely rapidly. Eggs obtained on the 25th July 1903; larvæ emerged next day; changed to pupæ on the 2nd of next month at night (some next night) and the imago emerged on the 6th August 1903. The caterpillars feed in rows along the edge of a leaf, lying closely pressed one against the other and continue this up to the last stage when they become more independent but still keep together in batches. The pupation takes place in the ordinary way, each larva going off by itself beforehand; so that the

pupæ are never found together. The little larva eats its way out through the side near the top and always makes its first meal of the shell. The separation of the larvæ into batches later on is determined by the carrying space of the leaf; when the crowd becomes too large for one, it breaks up into parties, and, before pupation, as already remarked, each individual goes its own way. Some of the larvæ grow much slower than the others, depending chiefly upon the greater or less ability to obtain sufficient food within a given time. At the commencement of life the little caterpillars as often as not sit on the underside of the leaf while feeding; there does not seem to be any preference for the upper or the underside. The butterfly is not a strong flier, keeps nearly always near to the ground though of course it rises to the tops of the food plants when looking for females or, more seldom, when seeking a place to lay its eggs: the flight is fluttering and, except when engaged in business, fairly straight ahead and horizontal. The insects are not often found frequenting flowers; they often rest with the wings held partially open, on the top of a leaf in the sun; but repose, with them closed over the back, at night and in rainy weather, on a stem, twig, underside of a leaf, grass-stalk, &c., in thickets and amongst the undergrowth. They like open places and are fond of the sun like others of the genus; but are never found in the jungles along the Ghats. The reason for this is the absence of the food-plant which is essentially a species of waste, desert places. The larva feeds upon *Salvadora persica* and *oleoides* as well as upon *Azima tetracantha*, all belonging to the *Salvadoraceæ*. The first is found along the sands on the Bombay sea-coast about Bandra and also in Kanara further south; the butterfly is found there too; in the latter District it is the only place where it exists; its distribution is given as continental and peninsular India but not in Bengal and Ceylon. Outside British India it is found in Aden, probably throughout Arabia, in Madagascar and Tropical Africa.

In a brood of, say, 50 individuals there will always be a couple of white females and this seems to be quite independent of climate as such have been bred both in Bijapur in the Bombay Presidency where the rainfall is very scanty, the jungle nil and the country flat, and in Kanara on the sea-coast where the rainfall is over 100 inches with plenty of hills and jungle close to. However, in the damp places the black markings on the upper sides of the wings in all specimens are larger and more intense.

117. Colotis protractus.—Male. *upperside*: rich salmon-pink. Forewing: base bluish-grey; a band along the costal margin black and joined on to a very broad, similarly-coloured band on termen that occupies the outer fourth of the wing; inner margin of terminal band irregular, extended slightly and squarely inwards in interspaces 1a, 1 and 3; a prominent, oval, discocellular, black spot extended downwards from the black on the costal margin; apex with elongate, bluish-grey spots in interspaces 3, 4, 5, 6 and 9

superposed on the black, terminal band. Hindwing : dorsum white ; terminal half of wing jet-black : a somewhat diffuse, subdorsal band of bluish-grey scales from base to the black on terminal margin. *Underside* : a beautiful light, greenish yellow ; disc of wings tinged with salmon-pink, conspicuous on the fore, more obscure on the hindwing. Forewing : a prominent, black, discocellular spot and a subterminal series of three more or less quadrate, black spots that decrease in size anteriorly in interspaces 1, 2 and 3, the spot in interspace 1 extended into interspace 1a and lengthened posteriorly outward to the terminal margin. Hindwing uniform. Cilia of both wings pale salmon-pink. Antennæ brownish black, ringed or spotted with white ; head, thorax and abdomen black, the thorax anteriorly with whitish hairs at the sides ; beneath : the palpi, thorax and abdomen pale yellow. Sex-mark : a small, glandular patch of scales near the base of interspace 1 on the underside of the forewing, sometimes visible on the upperside.—Female, *upperside* ground-colour similar ; the markings similar but the black along the costa and termen of forewing and of terminal half of hindwing dark, silky brown ; on the forewing edged interiorly along the costa and along the termen from vein 2 upwards with jet-black ; discocellular, black spot on the forewing much larger than in the male. *Underside,* forewing : base and cell anteriorly greenish yellow, disc salmon-pink ; apex and termen broadly dull, ochraceous pink ; discocellular and posterior, subterminal spots as in the male. Hindwing uniform ochraceous pink. Antennæ, head, thorax and abdomen as in the male, but somewhat duller in colour. Expanse 38-50 mm.

In Miscellaneous Note "No. XXIV.—Notes on *Colotis* in Sind" by Captain F. C. Fraser, I.M.S., dated Hyderabad, Sind, September 1910, which appeared in this Journal there is a description of the stages as under :—

Egg.—"Pure white, ampulliform in shape, strongly ribbed. Hatch out on the third day."

Larva.—"Grass-green, at first a crimson stippling along the sides but this gradually fades in successive moults until finally lost in the last. The final skin has a peppering of white, minute dots and tiny bristles covering the skin. There is a white, dorsal line along the back which may or may not have a yellow edging. In shape, cylindrical, like that of *T. hecabe.* This larva is interesting in that it is the only one of its genus (so far as the Indian forms are concerned) that has not got a black head when first emerging from the ovum."

Pupa.—"Creamy, flesh-coloured or pale green with no markings ; body stout, with a stunted point at the head. Suspended upright by waist-belt and anal attachments."

Habits.—The eggs are laid singly on the food plant. The larvæ thus live singly also. Their habits are not likely to differ in any way from those of *vestalis.* Captain Frazer states in the above notes that he has taken *Colotis protractus* (and *vestalis*) male joined to a female *amata* but unfortunately was not able to obtain eggs of the latter. He says that he has caught a specimen of *protractus* in which the salmon-colour of the wings was replaced by the creamy white of *vestalis* ; and he is evidently of opinion that hybridism plays a considerable part in the variations in colouration existing in *amata, vestalis* and *protractus.* The food plant of the larvæ of *protractus* is *Salvadora persica* (probably also *oleoides*, the other species of the genus *Salvadora*). The butterfly is found in Baluchistan, Punjab, Cutch and Lower Sind (perhaps all along the Indus throughout Sind).

118. Colotis phisadia.—Male, *upperside*: forewing: pale salmon-pink, this colour paler outwardly; base heavily irrorated with bluish-grey scales that extend outwards and are merged with a black patch that occupies the apex of the cell and spreads along the discocellulars: terminal third of wing black with enclosed spots of the ground-colour in interspaces 3, 4, 5 and 9, the spot in 4 sometimes absent, the inner edge of the black area emarginate at interspaces 2 and 4 ; the outer margin with a series of minute terminal specks of ground-colour in the interspaces. Hindwing white, base heavily irrorated with bluish-grey scales that are extended downwards in a diffuse band parallel to the dorsum; terminal half of the wing jet-black. *Underside*: precisely as in male *protractus*.—Female: very variable, but resembles the male in markings. On the *upperside*, however the terminal areas on both wings that are black in the male are silky brown on the forewing, the inner, sinuate margin of the same posteriorly black: on the hindwing the terminal, brown area encloses an irregular, sinuate, black band that does not extend either to the costa or to the dorsum. The ground-colour in some specimens is faintly pink fading to white outwardly; on the hindwing it is white as in the male. In other specimens the ground-colour of both wings is entirely white or pinkish orange. *Underside*: as in the male, but the apical area of the forewing and the whole surface of the hindwing tinged more or less with ochraceous. In many individuals, probably of the dry season broods, this ochraceous tint is very much marked. Forewing: with posterior, black spots as in the male. Hindwing: an irregular, discal, sinuate, macular, brown band that is often obsolescent. Antennæ, head, thorax and abdomen much as in the male. Expanse 38-46 mm.

Larva.—"Pea-green when young, two black spots on the back of the head, a white mark, almost the shape of an ace of diamonds but rather longer, on the second segment; when older, the black spots on the head disappear and the white mark gets clearer and is outlined with black. There are two similar marks just beyond the centre of the back, the front one being the smaller, and another, similar mark on the 11th segment." (*Nurse.*)

Pupa.—As figured: is stout, pale brown, more or less mottled with darker brown; in shape mainly cylindrical, with the wing-cases moderately developed; the head ends in a very sharp point.

The above descriptions are taken from Colonel Bingham's book.

Habits.—Nothing much is known; Nurse states that the larva feeds upon *Salvadora persica*, like that of *amata*. The only recorded occurrence of the species within British Indian limits are in Surat and Multan. It is found in Arabia and the opposite African coast.

119. Colotis vestalis.—*Wet-season brood.*—Male, *upperside*: white; fore and hindwings with broad, terminal, black bands. Forewing: base, costal margin broadly and discoidal cell except at its lower, apical area heavily irrorated with dusky-grey scales; a short streak at upper apex of cell joined to a large spot on the discocellulars, black; superposed on the black, terminal area are two small, preapical spots (sometimes wanting) and a much larger, subterminal spot in interspace 3, all white; minute, terminal specks also, often more or less obsolescent, in the interspaces, Hindwing: more uniform, very slightly irrorated with grey scales at base, the black, terminal band immaculate. *Underside*: greenish yellow sparsely sprinkled with black scales, the yellow very pale on the disc of the forewing fading to white on its dorsal margin; discocellular spots and three subterminal, posterior spots that are placed in a curve, black; the lowest spot of the three sometimes extended to the dorsal margin (var. *puellaris*). Hindwing uniform,

with a very small, annular spot on the discocellulars. Cilia white. Antennæ, head, thorax and abdomen black, the antennæ speckled and tipped with white, the thorax clothed with long, bluish-grey hairs; beneath: palpi, thorax and abdomen white. Female, *upperside*; very similar to the male, the terminal bands brownish rather than black. *Underside:* base and cellular area on forewing white suffused with greenish yellow; costa and apex of fore and the whole surface of the hindwing pale ochraceous; the forewing with the black spots as in the male, the hindwing, in a few specimens, with an anterior, post discal, sometimes somewhat obscure, macular, incomplete band (indications of the same in some males).

Dry-season brood.—Male and female: similar to male and female of wet-season brood but on the upperside the black markings are duller in tint and narrower, while on the underside in both sexes the costal and apical areas on the fore and the whole surface of the hindwing vary from pale ochraceous to dark reddish-ochraceous. Expanse 40-50 mm.

Egg.—The egg is white when laid, then turns yellowish and gets three, more or less regular, very broad, reddish bands round it: the first just above the base, the second round the middle, the third a quarter of the height below the top. The shape is like a long dome; there are 16 to 18 longitudinal ribs from base to top, 12 of which actually reach the top where their points form a low crown round the micropyle; the ribs are prominent and more or less triangular in section, the intervals being very distinctly striated with numerous parallel ridges; the space round the micropyle is smooth for a short distance; the surface of the egg is shiny. H. 0·8 mm.: B. 0·3 mm.

Larva.—The larva is somewhat more narrowed than that of *amata* in segments 2, 13, and 14; it is stout and cylindrical in segments 4-12; the head is slightly broader than segment 2, round from front view with the neck rather distinct and is somewhat flattened on face; the clypeus is large and triangular; the surface is dull and covered with minute, whitish tubercles from each of which springs a short, semi-erect, dark hair; the colour is grass-green with the labrum white but slightly washed with brown; the jaws, somewhat broadly black-tipped, and the second antennal joint also white; the labrum green and shining; the basal antennal joint green; the eyes brown. The surface of the body is dull, soft-looking, covered somewhat sparsely with minute, dull, light-yellow and whitish spots and many soft, short, lightish hairs which are not readily visible to the naked eye except along the subspiracular region where they form a whitish-looking, short fringe visible in some lights. Spiracles are small, brown-pink, oval, placed on an indistinct, lightish, spiracular line. Anal flap rather large, dorsally somewhat flattened, somewhat flanged round edges, trapeze-shaped, the dorsal slope being slight. The colour of the body is a fine grass-green with an indication of a spiracular light line; the ventrum somewhat lighter in shade as well as all the true legs and claspers. All legs and claspers are rather small and the anal ones are hidden from above by the over-reaching anal flap. L: about 20 mm.; B: 4 mm.

The yellow body-spots are really minute tubercles, one subdorsal, dorso-lateral and supraspiracular to each segment, each bearing a short, dark, erect hair ever so little longer than the other lighter body-hairs (though shorter than the fine, soft, subspiracular fringe) and there is a small, bare space round each such tubercle. Captain Frazer (*vide* above under "*Colotis protractus*") states that "first skin bears a shiny, jet-black head; body grass-green with crimson stippling laterally which, in the posterior three segments spreads upwards and meets that of the opposite side, so as to form a more or less prominent, crimson patch. This stippling fades during succeeding moults and is entirely lost after the last. The black colour of the head gradually

passes off also ; after the first moult it is present as a crown to the green head, this crown grows smaller and is entirely lost after the final moult. The final skin is identical with that of *protractus* ; when mixing the two together I have been quite unable to say which was *vestalis* and which *protractus.*"

Pupa.—The pupa is of the type of *Terias hecabe* or *Colotis amata* ; but it is rather stout and the head-point or snout is shorter than usual and somewhat bluntly rounded at extremity. The pupa is somewhat distinctly constricted behind the thorax both dorsally and laterally ; the wing edges laterally are also slightly more thickened ; the vertex of head is slightly more inclined in its dorsal line to the longitudinal axis of pupa that segment 2 and the head-snout has its dorsal line nearly parallel to that axis: differing therein from the pupa of *amata* in which the dorsal line of all three is nearly straight; the abdomen is shorter comparatively than in *amata* ; the pupa is thickest in the middle, whereas, in the species just mentioned, the pupa is, if anything, thickest at shoulders ; otherwise the two pupæ are similar as to surface and general appearance—except that, here, the cremaster has the subdorsal ridges more clearly defined, the surface being depressed between them as well as outside them. The colour is a pinkish bone-colour with a darkish dorsal line and some darkish marks on the dorsolateral region of abdomen as well as at the apices of wing-veins. L : 15·5 mm ; B : 4·5 mm.

Captain Frazer notes that the pupa is "identical with that of *protractus*, usually flesh-coloured and without markings."

Habits.—The eggs are laid singly and generally near the base of the plant on old leaves ; otherwise the habits are the same as for *amata* (except that here the larvæ are not gregarious) ; the pupa is more closely attached to the surface ; the larva is sluggish and generally wanders away from the leaves to pupate. The imaginal habits are much the same as for *amata* in every way ; the butterflies are fond of the bright sunshine in the mornings from 10 to mid-day and may then be found in numbers in Sind wherever the foodplant exists. It is commonest in the monsoon months up to the middle of September after which the numbers decrease. The upper or under surfaces of leaves are chosen indifferently for oviposition. Captain F. G. Frazer, I. M. S., says that, in Sind, in the month of July 1910, he took a female *amata* connected with a male *vestalis* ; and, a week later, repeated the experience ; and he states that he has caught a female *vestalis* in which the whole discal areas are suffused with the salmon-buff of *protractus*, as well as a specimen of this latter species in which the whole ground-colour is replaced by the creamy white of *vestalis* ; these he regards as hybrids. The food-plant of *Colotis vestalis* is *Salvadora persica* and its distribution is Baluchistan, the Punjab, Cutch, Sind, Rajputana, the Central Provinces ; and outside India, the Provinces round the Persian Gulf.

120. Colotis fausta.—Male, *upperside* : Salmon-buff, paler in specimens from desert areas, darker in regions where there is a regular though not heavy rainfall. Forewing : base and costal margin irrorated in varying degree with dusky scales ; an oval, annular, discocellular spot that varies in size ; a black, festooned, postdiscal fascia that extends from costa to vein 4, beyond which the veins are margined with black ; this fascia broadened subterminally into a second transverse fascia that is followed by a very fine

black line on the extreme terminal margin. In specimens from desert regions the transverse fasciæ and the black edging to the veins are narrow, but in moister areas the two transverse fasciæ unite posteriorly and with the slender, black, terminal line give an appearance as of a double, black series of spots of the ground-colour enclosed between them. Hindwing: more uniform, the veins with terminal, black spots; costa broadly pale, fading to white. *Underside*: pale yellowish white, in many specimens from moist localities suffused with a beautiful rosy flush; the markings in such specimens prominent, in those from dry localities more or less obsolescent. Forewing: discocellular spot as on the upperside but complete, and not an oval ring; in some specimens a postdiscal, dark ochraceous brown narrow, curved band from costa to middle of interspace 2. Hindwing: a small discocellular spot in the form of an oval, light brown ring always much smaller than that on the forewing; a postdiscal, curved, more or less sinuate band, similar to and in continuation of the band on the forewing from costa to vein 1. Antennæ, head, thorax and abdomen dusky black, the club of the antennæ on the underside, the hairs that cover the head and thorax and the scaling of the abdomen salmon-buff; beneath: much paler, fading to white in specimens from dry localities. Sex-mark: a small patch of brown, specialized scales on the underside of the forewing above vein 1, closer to the base than to the termen; on the upperside this is more or less prominent as a raised spot.

Female is dimorphic. *Form 1*: ground-colour and markings as in male; the costa of the hindwing on the upperside concolorous with the rest of the wing; the sex-mark of course absent. *Form 2, upperside*: ground-colour white, often more or less irregularly suffused on parts of the wing with salmon-buff; markings like in male though very much broader. Forewing: base and costal area heavily irrorated with greyish-blue scales. Hindwing: the terminal spots at apices of the veins large and quadrate, often united into a continuous band which then encloses an anteciliary series of spots of the ground-colour. In a few specimens there are traces of a post discal, macular, black band, in a very few this band is almost complete and very prominent. *Underside*: ground-colour white, markings as in male but broader, darker and more prominent. Expanse: 46-58mm.

The race *tripuncta*, Butler, is described as follows:—

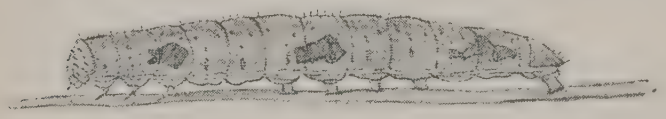
Male and female: very closely resemble the typical forms; but this, the southern form, can be distinguished as follows:—Male, *upperside*: ground-colour a much deeper tint of salmon-buff, almost orange-yellow. Forewing: the costa heavily irrorated with black scales; discocellular spot larger, not annular; postdiscal, black fascia at all seasons united to the subterminal fascia and black, anteciliary line so that the whole apex and termen of the wing are black, broadly at the costa and gradually narrowed towards the tornal angle. This black area encloses never more than three preapical, moderately large spots and a complete series of minute, anteciliary specks of the ground-colour. Hindwing: as in *fausta*, but the terminal black spots very large. *Underside*: ground colour of a richer, yellower tint than in the typical form; markings similar, those on the forewing dusky black, on the hindwing rose-pink. Antennæ, head, thorax and abdomen and sex mark as in the male of the typical form. Female, *upperside*: closely resembles the female *Form 2* of *fausta*, but all the markings are darker and conspicuously broader, while the number of preapical spots of the ground-colour enclosed within the black area on the forewing is never more than three, the same as in the male. *Underside*: forewing: white, sometimes faintly suffused with yellow; apical and terminal areas anteriorly light to dark ochraceous yellow; discocellular spot very large; transverse, postdiscal, macular, dark reddish-brown band very broad. Hindwing: pale

ochraceous yellow, sparsely powdered with black scales; transverse, post-discal, macular band reddish-brown and broad as in the forewing. Antennæ, head, thorax and abdomen as in female *Form* 2 of *fausta*. Expanse 52-58 mm.

The males of *C. fausta* and, therefore, of course, also of *tripuncta* can at once be distinguished from their females by having, in addition to the sex-mark of specialized scales and darker colouring, the dorsal margin of fore-wing curved convexly, the curve forming a considerable lappet over the subcostal area of the hindwing. In the female this dorsal margin is nearly quite straight. (K. Bernhardt in Journal B. N. H. S., Vol. XIX, Part 1, published 15th April 1909.)

Egg.—The egg is of the usual short-necked bottle shape, the narrow top part rather exceptionally short; with 18 meridional ridges meeting in a thickened ring round the top, their extremities not showing at all as teeth and hardly a single pair anastomosed. The surface throughout finely transversely striated and shining. The colour white when laid, turning yellowish shortly afterwards with three blood-red, rather irregular bands round it, the first some way above the base, the second about the middle, the third just before the narrowing commences. L: 0·7mm; B: 0·35mm. Laid anywhere on a leaf and generally on an old one; or on a stalk, twig, &c.

Larva—(*Vide* marginal figure).—The larva is of the type of that of *Colotis eucharis* except that it has not got the differentiated tubercles (in point of size) found in that species; the covering of hairs is far more like that obtaining in *Colotis danæ, i.e.*, it is rather denser than in *eucharis* and the main tubercle hairs are not much longer than the rest. It differs from the larva of this latter species however in the markings, having much more lateral, light pinkish-brown patching than the patched larvæ of that ever have. It is also of course larger when full-grown. The shape is that of *C. eucharis* as said, but segment 13 is perhaps longer here, and the anal segment certainly is longer and it is perhaps also more concavely emarginate (though, even so, only shallowly) at extremity, the emargination affecting the whole terminal margin; the segment is also perhaps not quite so thickened at extremity. The *head* is round, not large, though nearly as broad as segment 2 the straight front margin of which slightly infringes on the vertex; the clypeus is large and triangular, the false clypeus arching over, and including the apex (the sides of true clypeus quite straight); the surface of the head is covered with quite short, dark-brown, semi-appressed hairs but in no way so closely as to hide the surface, all pointing downwards and the tubercles (white) they rise from are hardly visible even with the lens they are so minute; otherwise the surface is smooth and hardly shiny; the labrum is longitudinally (to body-length) corrugate, green; the ligula large as usual, pinkish; the antennal basal joint is green, shiny, the second joint brownish; the mandibles dark at ends; the eyes glassy, very slightly stained with brown. *Spiracles* are oval, the centres green surrounded by a somewhat broad, hardly raised, brown margin; those of segments 11 and 12 (and not 2) larger than the rest as in the larva of *Colotis danæ*. The *surface* of body is transversely lined on each segment by 6 parallel lines, the first being some distance behind the anterior margin each time, the intervals between all others being equal: the whole surface covered somewhat closely by very short, fine, whitish hairs (except on segment 2 where they are rather dark) rising from barely visible, minute, white tubercles: the main subdorsal, dorsolateral and supraspiracular one on each segment being about twice the length of these (still very short therefore), dark, rather thicker with the



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usually rounded end (where the drop of liquid rests); as usual, also, there are longer (only slightly here however), fine, light hairs in the subspiracular region and lateral ventral region; still longer ones at the extremity of anal flap where each one is also thicker and dark. The *colour* is a rather fine rich green dorsally with, sometimes, a dorsal, clear yellow, narrow band continued on to the vertex of head; the belly, true legs and claspers much lighter and glaucous; the feet lobed, the hooklets brownish; there are generally three (there may be 11 of them, one on each segment 2-12 forming an uninterrupted chain, broadening out, round each spiracle upwards, always narrowest at segment margins; sometimes suffused greyish) large patches present, light pinkish-brown in colour, always margined darker, in the spiracular region of segments 2, 8 and 11; on each segment they nearly always are bordered by the front margin and stretch back, including the spiracle as a very general rule, the whole breadth of the segment, encroaching on to the next succeeding segment often to include the spiracle of that, generally narrowest at the segment margins increasing in width towards the segment-middle, reaching rarely at broadest part to more than the dorsolateral region above, never stretching on to ventral region; these patches may all be small, the front one may be wanting (segment 2) and the shape is hardly ever the same in any two larvæ. L: 25 mm; B: 4 mm.

Pupa—(*Vide* marginal figure).—The chrysalis is like a large *Colotis amata* pupa in shape and way of hanging. The longitudinal axis of the body is quite straight from the tip of the short, conical snout to the end of segment 13, the cremaster after that being slightly curved under; the thorax is slightly humped and the ventral wing-bulge is quite normally convex; the shoulders are the widest part of pupa and are somewhat suddenly prominent from hinder margin of segment 2; the lateral outline of pupa—the breadth, that is, narrows very slightly behind them gradually to where the body string passes (the pupa is therefore very slightly constricted laterally) and then broadens again gradually to middle where it is nearly as great as at shoulders, thereafter gradually and evenly decreasing again to cremaster; the dorsal outline is straight from behind thorax to end of segment 8, curving gradually thence to cremastral extremity; the ventral line from front of head-point to end of wings, over the bulge, is 14mm of which the straight portion from front to apex of bulge is 10mm; the ventral line of segments 9 to end is gently curved towards longitudinal axis. The head point is a good deal broader at base, which base embraces the whole width and depth of head, than it is high, it is conical with its apex bluntly rounded; segment 2 is in even continuation with the head, (or base of the point rather) is transversely convex, and the front slope of thorax is again in even continuation with it, the dorsal line of head, segment 2 and front slope of thorax being quite straight at an angle of about 35° with the longitudinal axis of pupa; segment 2 hinder and front margins are slightly bent towards each other in dorsal line and its length is somewhat less than the length from end of head-point to the hinder margin of head (front margin of segment 2); the hinder slope of dorsal line of thorax is very gentle and runs imperceptibly into the dorsal plane of abdomen; the hinder margin of thorax is a somewhat gentle curve, the ends of which on each side become nearly a straight line before impinging on wing-line which they do at right angles, the actual angle being an

× 2

open curve; this hinder margin of thorax has some shallow indentations just in front of it dorsally, a single row; the whole thorax (segment 3) is short; the cremaster is rather long, quite as long as segment 13 and is trapeze-shaped, narrowing backwards, the hinder margin or extremity being very distinctly concave, the lateral margins are thickened and run on to segment 13, the dorsal extensor-ridges are not prominent converging from somewhat flattened extreme hinder corners forwards to front margin where they are well separated, the suspensory hooklets are between them at hinder margin of cremaster and are ventral; the ventral extensor-ridges are more or less parallel, ending each in a little free point; the antennæ, as in all other members of the genus *Colotis*, end, flattened, at the apex of wing-bulge. Spiracles of segment 2 hardly indicated; others oval, colour of pupa, very slightly raised, with a central, depressed line. Surface of pupa is irregularly corrugated, under lens, by impressed lines, pitted also on abdomen, the intersegmental membrane between segments 8, 9 and 9, 10 narrowly exposed; the lateral outline along wing somewhat prominent (the wings are slightly expanded that is) from shoulders to end of wings; the rounded extremity of head-point or snout is smooth. Colour is that of fresh, dry bone, somewhat livid; lateral outline from shoulders to cremaster, above spiracles on segments 8-12, narrowly light, this line on abdomen being brought out by slight, dark shading above it; a black dot laterally near front margin of each segment, sometimes a larger dorsal one near hinder margin of segments 8 and 9; the spot on discocellulars of wings also black; fuscous dots showing at ends of veins of hindwings; shallowly impressed similar dots outside outer margin of antennæ. The pupa is sometimes light green with the lateral line faintly yellow; there is sometimes an indication on head and the succeeding two segments of a dark dorsal line. L: 19 mm; B: 5 mm. at shoulders, the broadest part; H: 6 mm at apex of wing-bulge; B: of abdomen at segment 9: 3·5 mm.

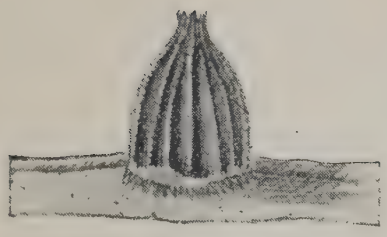
Habits.—The eggs are laid separately on the foodplant, generally on an old leaf but sometimes on a dry twig or leaf-scar; if on a leaf, then indiscriminately on the upper or under surface or on the edge; one female was seen to lay 20 eggs in quick succession on a single plant, coming to rest with her wings closed over her back at each operation; the noteworthy feature being the short time she took over each act. This particular female was discovered flying or rather fluttering along over the ground about 11 a.m. in the month of August near Sholapur in the Bombay Presidency; she was followed up for about two hours carefully by two men in grass-land with an open covering of small trees: *Acacia arabica, Capparis divaricata, Mimosa rubricaulis,* Sandalwood, Neem, &c. She kept much to the shade of the trees the tops of which (there were none of them over 25 feet in height) she often explored; often rested on the ground with half-opened wings for ten minutes at a time; until, finally, she found what she wanted: the foodplant of the larva, up to that time unknown. Upon this she immediately commenced laying, and each egg was carefully collected and preserved for breeding purposes. Afterwards, however, a number of larvæ were also found, some of them, a few, full-grown and nearly ready to pupate. Three quarters of them were parasitized and produced ichneumons; three eventually survived to the pupal stage. The males fly fast,

generally keep fairly close to the ground, rising occasionally to fly round the foliage of a tree, and keep a more or less straight course which permits of fairly easy capture with a net; they also frequently go to flowers among the grass and rest while drinking the nectar; the females do this too and can also be caught though they are not nearly as commonly seen as the males. The butterfly never seems to be very numerous in individuals where it is found as far as the experience of the writer goes; but at the same time that experience is not very wide, so the statement must be taken for what it is worth. The insect is fond of the sun and open places, indeed it does not exist in jungles at all and certainly avoids the regions of heavy rainfall; it is one of the characteristic butterflies of the plains and desert regions. The males and females often rest upon the ground with the wings closed over the back and the front ones drawn down between the hinder; they will take short flights when disturbed and settle again close by and, when at this game, are easily caught with a net. The larvæ are at first little greenish beasts with the dorsal region lighter, the lateral region speckled closely with brown, the main tubercles well developed with conspicuous hairs and a drop of clear or amber-coloured liquid on the top of each hair; the anal segment has two tubercles with radiating short bristles; the head is orange-brown and has the tubercles and hairs well developed. The full-grown caterpillar is very difficult to spot on the foodplant as the pinkish brown patches along the sides with their narrow, darker bordering and the green of the rest of the body harmonize so well with the colour of the leaves of the foodplant and the brownish scars left on them by the withering of the thin cuticle remaining at the bottom and round the edges of the places where the young larvæ have been feeding; for the small egg-caterpillar eats into the substance of the leaf in irregularly rounded holes of various diameters, always leaving the cuticle at the bottom of the hole thus made untouched; this method of feeding goes on for the first three stages and the little animal may often be found lying at the bottom of the hole; or rather it should be looked for there—it is not easy to find. The mature larva often sits along the edge of the leaf or on a twig or branch or leaf-stalk but is never easy to see; particularly when along a leaf-edge. The foodplant is *Maerua arenaria*, H. (*Capparidæ*) a climbing shrub, what the ordinary person would call a climber, with ovate leaves, varying much in shape, sometimes narrow, sometimes broad, always with a tiny little point at the end (an *apiculus*), smooth, sometimes softly downy, the old ones thick and fleshy, rather like those of *Salvadora persica* including the light brown marks from wounds by insects, &c.: except that they are opposite; in the *Capparideæ*, they are alternate. The real Capers (genus *Capparis*) are found in all sorts of places, hills and plains, open country and jungles, desert tracts and regions of the heaviest rainfall, whereas

Mærua is confined to places of fairly light rainfall, where the vegetation is comparatively scant and more or less desert localities. Hence the butterfly is also confined to such places; so that *Colotis fausta* and its form *tripuncta* are found in Baluchistan; Sind; the Panjab; Rajputana, extending westward to Afghanistan, Persia, Arabia, Asia Minor and European Turkey; Western and Southern India; the Nilgiris up to 6,000 feet, the Anamalai Hills; Eastern India; Orissa in Bengal, Ganjam; Ceylon. *Fausta* is supposed not to extend south of Bombay; *tripuncta* is supposed not to exist in Sind. This latter however *does* occur in Sind round Karachi and the probabilities are that the two are really one species, notwithstanding that only *tripuncta* has seemingly, always, the white form of the female.

121. Colotis eucharis—Male, *upperside*: pure white. Forewing: base and costa for a short distance generally sparsely irrorated with black scales; a broad, apical, orange-yellow patch with its inner edge straight and margined with gamboge-yellow; this spot is sometimes immaculate but generally bears a black, diffuse spot on its lower, inner edge which may or may not extend to the termen below the orange; costa, apex and termen, the latter nearly up to the tornus, edged and festooned beyond the orange area with black. Hindwing: with black spots at the apices of the veins that vary in size and end on the termen, also a diffuse, preapical, black spot on the costa. *Underside*: pure white in most specimens, suffused, except on the disc of the forewing, with pinkish-yellow and, at base of the same wing, with pure sulphur-yellow; apical, orange patch and terminal, black markings on the upperside of the forewing show through by transparency, the former crossed by a sinuous, fuscous fascia that ends in a diffuse, black spot. Hindwing: shaded with ochraceous at base with a fuscous, preapical spot on costa; also a few scattered, transverse, fuscous striæ and small spots. Many specimens have the preapical, fuscous spot continued as an obscure, fuscous fascia across the wing and bear a series of large, terminal, fuscous spots that correspond to the black spots on the upperside. Both wings with black, discocellular dots. Antennæ, head thorax and abdomen black; antennæ speckled with white on the sides; head and thorax clothed with short, greyish-brown hairs; beneath: palpi, thorax and abdomen white. Female: ground-colour similar, the markings differing from those of the male as follows:—*Upperside*, forewing: base and costa more heavily irrorated with greyish black scales; discocellular spot larger; apical area black, with three enclosed, elongate, orange spots; inner margin of black area irregularly sinuate and diffuse, extended shortly inwards in interspace 3; a transverse, black spot across middle of interspace 1. Hindwing: base irrorated more sparsely than the forewing with greyish-black scales; preapical-costal and terminal spots much larger; in a few specimens there is an obscure, transverse, posterior, discal fascia. *Underside*: markings similar to, but very much broader and more heavily marked and more prominent than, those in the male; the transverse, fuscous striæ and dots more numerous. Antennæ, head, thorax and abdomen as in the male. Expanse 36-50mm.

Egg.—The egg is shaped as in the marginal figure which is magnified thirty times. It has 17 longitudinal ribs, some of which coalesce before reaching the top; reaching the top, after coalescing, in a single point or tooth for each ridge thus formed, each composite ridge no broader than either of the original two (or three); the teeth form a tiny crown around



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the top of egg; each rib is cross-rayed many times producing a beaded appearance; the intervals between the ribs perhaps slightly broader than them, concave and apparently smooth. In the light the ribs glisten through their entire lengths and are apparently triangular in section. The size of the egg is 0·5mm. in height by not very much less in breadth but the one from which the description was made was slightly broader along the direction of the edge of the leaf on which it had been deposited than in the other direction. Surface slightly shiny, colour orange with subcutaneous dull blotches.

Larva—(Pl. 2, fig. 20).—As compared to the larva of *Colotis danæ* just described it is distinguished, apart from the shape and colouring, by the fact that here the body tubercles, that is the subdorsal, dorsolateral and supraspiracular (the only one of the spiracular group present here also) being comparatively large and conspicuous; the measurements are as nearly as possible: the tubercles, as broad as high, perhaps very slightly broader at base than at top, are 1/6th of a millimetre, the hair borne by each is ½ a millimetre or three times as long; and the hairs are erect, black and cylindrical, with a spherically thickened tip, bearing a drop of clear or brown liquid. The *head* is nearly exactly similar to that of *sanæ* in the number and shape and colour of the tubercles it bears, but the hair on each is white, not black and there are no smaller subsidiary tubercles; the surface is minutely shiny-frosted, the head is round, has a similar clypeus and false clypeus, has the antennæ, labrum and ligula green, the eyes similar, surrounded by a fine brown line at their bases; the jaws are dark-tipped. The *spiracles* are similarly oval, raised, shiny but are rather dark-brown and those of segments 11, 12 are not, or hardly, larger than the rest. The *surface* of the body is lined transversely like in the other species with 7 lines to each segment, the dorsal region or half-somites are not separated from the ventral by any ledge; besides the usual hair-bearing tubercles, the surface is covered with little white tubercles of the same shape and size as the head, spaced about two tubercle-diameters apart, each one bearing a translucent, white, thick-topped, erect hair; these tubercles are not half the length of the big ones (not 1/12th mm. that is) and the hair is about as long as the tubercle bearing it; except in the spiracular region and down on to the ventrum laterally including the bases of prolegs where the tubercles are sometimes twice as long nearly (not quite) but always thinner than the main ones, and bear white, fine hairs quite as long, in some cases longer, than the main black ones—so that the larva has a fringe of these comparatively long, fine, white hairs all round. There are subdorsal, dorsolateral and supraspiracular tubercles on all segments 2—13, those of segments 3, 4 all in a line along centre of segment, the subdorsal, supraspiracular and an extra lateral one along the front margin of segment 2 (the dorsolateral about centre behind these); all the tubercles are wide apart, that is the subdorsals are widely separated on each segment as well as the dorsolaterals, these latter much wider than the former. The shape is that of *Terias hecabe*. *Colour* of body and head dark green to yellowish green with a light dorsal band generally present, body spotted obscurely darker; in some larvæ there is a large, more or less triangular brown-pinkish white patch including spiracles of segments 6, 7, 8, the anterior one generally the smallest, increasing backwards, the largest never reaching the line of the dorsolateral tubercles, bordered in front by the front margin, never reaching back to more than centre of segment; true legs, belly, prolegs light bluish green; feet lobed (semicircularly) with pinkish booklets. L: 20mm; B: 3·5mm.

Pupa.—(Pl., 2, fig. 20*a*).—The shape of the pupa resembles that of *Pareronia* far more than any other: it is not in the least like the other *Colotis* species; it has the ventral wing-bulge extremely accentuated and a long generally upwards-curved, sometimes somewhat twisted, snout to the head. The portion of the body composed of segments 1-4 is thrown back at an angle of about 30° to the rest, the snout counted from the head-frons is as long as the distance from the same place or point backwards to the apex of thorax "hump": it is 3 mm. or slightly more in length and is directed forwards (or down as the pupa generally hangs) in exactly the same straight line as the ventral line of the pupa from segment 1 to apex of wing-bulge opposite segment 7; the snout is longly conical, not always straight throughout its whole length but often curved towards dorsum of pupa, sometimes bent to the side into the margin in its distal part, its basal diameter is less than that of head and the lateral contour of pupa from it to shoulders is a gradually widening triangle; from shoulders back to segment 8 the lateral lines very gently converge towards each other again and there is a slight constriction in the otherwise straight line of the slight lateral wing-expansion at the place where the body-band or suspension-loop passes; the abdomen is more or less circular in transverse section, rather short and stout, gradually thinning to end where it finishes off in a rather broad, trapeze-shaped cremaster which is as broad as long for the last half of its length, is convex transversely over dorsum, has thickened lateral margins, two dorsal ridges from the hinder lateral corners converging forwards to nearly meet in dorsal line at front margin and two ventral extensor ridges ending each in a minute, free, sharp tooth anteriorly. Segment 2 is as long as half thorax-length and has its two margins (front and hinder) curved considerable towards each other in dorsal region (where it is thus narrowest) it is convex transversely and its dorsal plane inclines gradually away from longitudinal axis of pupa towards thorax: the thorax is not very prominently humped, the apex of the hump (which hump is evenly rounded) is just behind the middle of its length, hinder margin is a gentle curve meeting the wing-line in an angle of 90° open and sharp. The *spiracle* of segment 2 is just a linear indication which is quite straight and has a very slight white, narrow, raised surface behind it on the front margin of segment 3; other spiracles are nearly white, oval, perhaps rather large, flush. The *surface* of the pupa is rather coarsely shallow-pitted, irregularly impressed-lined and tuberculate-corrugated (of course very shallowly and only visible under lens) on the wings and segments 1-3; the antennæ (which by the way in these pupæ reach only to apex of wing-bulge) are serrated along their edge (characteristic of this species) with little sharp teeth: the snout is very tuberculate-rugose. The *colour* is glaucous green with a yellow shade, the lateral wing-line from shoulders, continued along abdomen to cremaster, yellow-whitish, the whole surface vermiculated with little short, whitish lines or marblings; a black spot on discocellulars of wing, a few faint ones towards middle of inside margin of antennæ: and there may be a lateral black dot on each segment dorsally as well as a dorsal line at hinder margins of segments 8, 9. The colour may be darker green; then the wing-margin is yellow; the colour may be light yellowish brown marbled and blotched with white and darker brown. L: 17 mm; B: 4 mm; H at apex of wing-bulge: 6 mm. nearly.

Habits.—The eggs are laid single, often on a dead thorn or stick; the larvæ live generally on the underside of the leaves; though sometimes in the middle of upperside, sit sometimes with the front segments very much in the air, occasionally with the tail end also raised. They are sluggish and drop, curling up, when disturbed.

They turn pink before pupation; and are very subject to parasites, ichneumons and flies being the usual enemies, especially the former; out of every 10 larvæ found, at least six or even more die from this cause. The pupa is attached very firmly by the tail to the underside of a leaf or the stalk, or stem of the plant, or a dead twig amongst the rubbish that generally surrounds the bushes of *Cadaba indica*, the commonest foodplant. The butterfly emerges in about a week. It is a somewhat weak flier and hardly ever rises far from the ground, is generally found in numbers near or around the foodplant, of the flowers of which it is very fond and it is most active in bright sunshine in the middle of the day when it is quite difficult to catch; it comes easily, however, to a decoy placed on the ground, though only males can be thus caught. The female is not often seen somehow, probably it attends strictly to business and keeps to the thickets. The insect rests with its wings closed though not drawn in between each other at all, very frequently on the ground, less often on the undersides of leaves, twigs, &c. In rainy weather it is possible to catch it in the fingers when thus resting as it becomes more or less stupid in the absence of the dry, hot sunshine. Its distribution is "Central and Southern India from Bombay to Travancore; Ceylon." It is not found in the jungles at all as it is a Plain Country species. It is nearly always met with in company of *Colotis etrida* and *C. danæ*, as the foodplants are the same for the larvæ of all three. These foodplants are all of the Caper family and this species has been bred nearly always from caterpillars found on *Cadaba indica*, a scandent shrub common in waste places and hedges in the Deccan with generally oval, thickish, small, dark green, smooth (except when young when they are lighter, longer and somewhat mealy) leaves, white flowers with a curious pinkish claw and long stamens and a long round pod bursting and curling lengthways to expose the bright red inner part.

A few days before writing this, numbers of the butterfly were noticed at Bandra on the sea coast north of Bombay in the Thana District; they were flying round a single bush of *Cadaba* which happened to be growing in a hedge round a house on Bandra Hill.

122. Colotis etrida.—(Pl. J. Figs. 67 ♂, 67a ♀.).—Male, *upperside*: white, sparsely irrorated at base of fore and hindwings with black scales. Forewing: a small, black spot on the discocellulars; apex broadly black, with an enclosed, oval, curved, rich orange patch placed obliquely and traversed by the veins which there are black; inner edge of black area diffuse. Hindwing uniform except for a preapical, short diffuse, black streak from costa, sometimes absent and a series of terminal, black spots that, in specimens from moist localities, are very large. *Underside*: white, cell and apex of forewing suffused with sulphur-yellow, the orange patch of the upperside shows through by transparency, its inner edge margined anteriorly by a very oblique, obscure, fuscous fascia. Hindwing: the preapical, short, transverse, black streak on the upperside obscurely

indicated. Female very similar to the male but can be distinguished as follows :—*upperside*: forewing: orange patch enclosed within the black, apical area narrower ; a small, black spot in the middle of interspace 1 and another in interspace 3 (there may be an indication of one in interspace 2 also). Hindwing : the terminal spots slightly larger. *Underside*: apex of fore and whole surface of hindwing suffused lightly or, in specimens from very dry localities, heavily with ochraceous. Forewing : spots in interspaces 1 and 3 as on upperside. Hindwing: a curved, almost complete, discal series of fuscous spots ; otherwise as in the male. In both sexes the antennæ vary from white to pale brownish ; head, thorax and abdomen black, the head and thorax with short, greyish-brown hairs; beneath: the palpi, thorax and abdomen white. Expanse 30-44 mm.

Egg.—Longer than broad, cylindrical for its basal $\frac{2}{3}$rds, the apical third conical, somewhat narrowly truncated ; there are 8 longitudinal ridges which are well defined, rounded in section, transversely finely striated running from base to apex ; the concave intervals also finely striated cross-ways, except in the very centre, narrowly ; the ridges all end abruptly round the apex showing little sign of teeth. Surface shiny. Colour when laid yellowish changing later on to reddish caused by profuse blotching. L: 1 mm. ; B: 0·5 mm.

Larva.—The larva is like that of *Terias hecabe* in facies but has the anal segment shortly but obscurely bifid-knobbed, the hinder margin of the flap being distinctly indented and the dorsum depressed between the knobs ; body cylindrical, narrowing in anal segments and, slightly, in 2 and 1, the colouration is also different. Segment 2 is slightly broader than the head. The head is roundish, the clypeus large and curvilinear-triangular ; the surface is covered with minute, light-coloured tubercles, each bearing a short, stiff, dark hair ; the colour is glaucous green, the eyes are brown, the labrum watery green, the antennæ green. The surface of the body is slightly shiny, rather coarsely transversely and paralleledly lined and set all over with minute tubercles, each tubercle bearing an erect, short, black or dark hair ; among these are the usual subdorsal, dorsolateral supraspiracular (slightly behind the spiracle) and subspiracular tubercles, slightly larger than the rest and bearing, each, a longer hair from the point of which exudes, sometimes, a drop of clear liquid ; all the tubercles are greenish bluish-white in colour. The spiracles are small, slightly prominent, oval shining, light, watery, green ; on the band. The colour of the larva with a broad, white, spiracular band touched with orange above each spiracle and bordered below by a slightly less broad, purplish-chocolate band, both bands reaching the whole length of the body ; ventrum green ; legs and proleg green. L : 19mm. ; B : 3mm.

Pupa.—The pupa is also of the type of that of *Terias hecabe*. It has a slightly turned up snout and a distinctly bifid cremastral extremity : the points being very bluntly rounded with a considerable depression between them. There is a slight lateral constriction behind the thorax. The body surface is somewhat granular on the wings, smooth elsewhere though slightly aciculate-lined under the lens. The spiracles of segment 2 are indicated by a longly oval surface facing somewhat backwards, formed by the raising of the hinder margin of segment 2 ; the other spiracles are oval, slightly raised, of the usual size, and are white in colour. The colour of the pupa is a pinkish bone-colour with a strongly green-sepia band above the spiracular line from segment 6/7 to segment 13 ; a similarly coloured dorsal band from head to same segment ; the abdomen is streaked with three similar, light-coloured bands on each side longitudinally, these bands interrupted narrowly at the segment margins ; the wings have the veins thinly white with a green-sepia splash down the middle of each wing ; the dorsum is, besides

marked with green-sepia, there being a blotch on each segment just above the supraspiracular band with a minute, black spot beneath : this spot is larger on segment 5 than elsewhere ; a whitish band along the dorsal margin of wing from shoulder to segment 7. This pupa was formed under glass ; formed among leaves it has a more or less strongly green colouration. L : 18 mm ; B. 3·5 mm. at shoulders which is the broadest point ; the height at apex of wingbulge is 4·5 mm.

Habits.—The eggs are laid singly on the young shoots, on a flower bud or on the upper or underside of a leaf, on a withered stem, twig or stalk, in fact anywhere. The larvæ feed upon the young parts generally. They rest in the centre of the upperside of a leaf, along the midrib as usual, on a bed of silk ; and will fall to the ground, curled up, when alarmed. The pupation takes place as usual but nearly always on a leaf close to the ground, on the underside, so that the chrysalis is exposed to the soil or a dead leaf or other light object which probably accounts for the majority of those found being bone-coloured instead of green. The ways of the butterfly are more akin to those of *C. danæ* than to any of the others; it is fairly strong on the wing and rises often a good distance from the ground and will face open spaces with unconcern. Otherwise there is nothing particular about its ways to call for remark ; it may be found most plentifully about the foodplants like the others. The caterpillar feeds upon Capers and it has been bred most commonly upon *Cadaba indica*, Lmk. It, however, eats *Capparis aphylla*, Roth. quite readily and probably various other members of the *Capparideæ*. *Colotis etrida* is distributed throughout India with the exception of Bengal ; also in Baluchistan and Kashmir. It is not found in jungles.

There is a race, *limbata*, Butler, found in Ceylon which is hardly separable from typical *etrida*.

121. Colotis danæ.—Male and female : colouration very variable, especially in the female.—Male, *upperside* white, base of wings generally irrorated, but to a varying extent, with black scales. This irroration in many specimens is entirely wanting. Forewing, with or without a minute, black speck on the discocellulars ; apex broadly carmine, edged internally and externally with black, this black border varies in width, but both inner and outer borders meet on the costa and on the termen ; on the latter they unite and sometimes extend as a black line to the tornus. Hindwing : uniform except for a series of black, terminal spots which, in some specimens, are comparatively large and connected together by a slender, anteciliary, black line, in others, minute more or less obsolescent, unconnected dots. *Underside* white. Forewing : base of cell washed with sulphur-yellow ; spot on discocellulars as on upperside : apical, carmine area of the upperside represented by an ochraceous-pink patch, not margined with black, but similar in shape and position ; in some specimens this is more or less suffused with greyish scales ; in all it is crossed near its inner edge by an obliquely-placed series of four or five spots that vary in colour from pale carmine-ferruginous to black. In some specimens there are two terminal, diffuse, black spots, one each at the ends of veins 2 and 3. Hindwing : the ground-colour lightly, often heavily suffused with ochraceous-pink ; sometimes pure white ; a small spot on the discocellulars pale ferruginous to black, sometimes annular and centred with carmine,

followed by a curved macular, discal band that also varies in colour from pale ferruginous to black and has the posterior spots often obsolescent or even completely absent; a series of minute, black dots at the vein ends that runs to the termen and may or may not be connected by a slender, anteciliary, black line. Antennæ pale-brown speckled with white; head, thorax and abdomen black; head and thorax anteriorly clothed with brown, sometimes greyish-black hairs; beneath: palpi, thorax and abdomen white. Female *upperside* white, base of wings lightly, often heavily, irrorated with greyish-black scales. In some specimens the irroration is very scanty, in others it occupies fully a third of the wings from base and extends as a broad band parallel to dorsum on the hindwing. Forewing: an apical, carmine patch as in the male but smaller, sometimes reduced to a mere row of preapical, pale-rosy streaks, but always bordered externally, and generally internally also, by black of varying width. In some specimens the inner-black border is very narrow, in others broad and in a few, entirely absent. The outer border, again, in some specimens, is inwardly festooned and may be either broad or comparatively narrow. Discocellular spot as in the male but larger, followed by an anterior, postdiscal, macular, curved, black band, the upper spots of which cross the carmine area or, when the carmine area is reduced to short streaks, the band crosses the black, internal edging to it, showing up in a darker tint than the edging itself; lastly, a black, transverse, somewhat diffuse spot in interspaces 1 and 2. Hindwing: with a dusky spot on the discocellulars; a black, macular, discal, curved, more or less incomplete band, and a terminal row of black spots that in some specimens are connected to form a continuous band. All these markings are generally diffuse. *Underside*, forewing: white, suffused with sulphur-yellow at base of cell and with ochraceous (in some specimens ochraceous-grey, in others ochraceous-red) on apical area; spot on discocellulars, the postdiscal, macular band and spots in interspaces 1 and 2 as on the upperside, but more clearly defined, the spots that compose the postdiscal band sometimes annular. Hindwing: white, suffused to a greater or less degree with ochraceous, sometimes pink spot on discocellulars and discal, macular band as on the upperside; but both the discocellular spot and the spots that compose the latter more clearly defined, annular and generally centred with carmine; a terminal row of black specks which may or may not be connected with a very slender, anteciliary line. Antennæ, head, thorax and abdomen above and below as in the male. Expanse 40-52mm.

Larva.—The larva is somewhat like a small *Hebomoia* in that the dorso-ventral line is somewhat flanged; that is, the otherwise even curves of the transverse section is slightly prominent-angled there; the colouring is also, somewhat like that of *H. glaucippe*; the 12th segment is however here slightly swollen dorsally and laterally, though evenly. The *head* is about the same diameter as segment 2; its vertex is sometimes, when the larva is at rest, slightly covered by the straight front margin of that segment; the shape is round, the clypeus is large and triangular, longer than broad and about half the length of the height of the head; the false clypeus appears over its apex as an arch; the surface of the head is set with many minute, lowly cylindrical, white tubercles, the intervals between them amounting to about two or three tubercle-diameters, each tubercle bearing a short, stiff, black hair directed downwards, each hair being not quite twice the length of the tubercle from which it springs; there are still smaller, similar tubercles, difficult to see because of their minute size, in the intervals; the colour of the head is green, the eyes are white-glassy, sometimes touched with brown, arranged 5 in a gentle curve, the 6th inside it and opposite the middle one; the labrum and ligula are shiny green: the antennal second joint suffused-brownish, the basal joint green; the jaws are tipped dark. The *surface* of

the larva is tranversely 7-lined on each segment, the lines being parallel, thin-depressed; the usual tubercles are present, white, of the same size as those of the head and of the same shape, each bearing an erect, black hair about twice their own length; the dorsolateral ones rather far apart on each segment, the supraspiracular one being the only one of the spiracular group that is traceable; besides these tubercles the body is covered with many, still more minute, similar tubercles bearing, each one, a tiny, black, erect hair; on the belly, where the tubercles also exist, the hairs are white; each of the larger tubercle-hairs—the subdorsal, dorsolateral and supraspiracular ones that is—bears at each point a globular drop of clear fluid. The *colour* is generally glaucous green with many indistinct whitish spots or short lines, one on each side of each minute tubercle or hair, the length of the line being limited by the breadth of the transverse ridge along which these hairs are arranged; there is a white spiracular broad line, on which the spiracles are situated, from the head to the end of anal flap and along its hinder margin which may be bordered above by plum-colour or brown-orange; the true legs and prolegs are glaucous green, the feet lobed (semicircular) with brown hooklets. The *anal flap* is trapeze-shaped in outline, the hinder margin not very much shorter than the anterior margin, the lateral margins perhaps longest, the dorsal surface very slightly sloping towards the longitudinal axis of larva, the posterior margin very gently concave between its extremities, slightly thickened. *Spiracles* rather large perhaps, shiny-greyish with very thin brown margins, rather broadly oval, slightly raised; those of the segment 2, segment 12 and, curiously enough, also segment 11 larger than the rest. L: up to 20mm.; B: 3·5mm.

Pupa—(*vide* fig. in margin)—The pupa of this species is stout, with a short, thickly conical snout or head-cone—it can hardly here be called a snout— which is not as broad at base as the pupa at eyes; it has a prominent ventral wing-bulge of which the length from top of snout (quite straight) to its apex is 11mm, the length from apex to where it ends at segment-margin 8/9 is 4mm, the height from apex to dorsum of pupa is 6·5mm; the thorax is moderately humped and the line of dorsum of abdomen, if continued through the anterior segments forwards, would pass through the shoulders and out through the eyes, so that the part of pupa embracing segments 1-4 is slightly inclined up (dorsal) to the abdominal part; the snout is 1mm long by the same breadth at base; in fact, an equilateral triangle or cone; the breadth of the pupa at eyes where it suddenly widens from base of snout is 2·5mm whence backwards it increases very little in breadth for the short distance to shoulders where, suddenly, the breadth becomes 4·5 mm, gently decreasing backwards to the very slight constriction where the body-loop passes over the posterior portion of segment 5; thence to cremaster the lateral outline converges gently at first, then more rapidly, to end in the trapeze-shaped, laterally thick-margined, cremastral piece with a moderately gently concave posterior margin, and subdorsal ridges starting from the hinder corners, converging forwards, but separated considerably at the front margin; the ventral surface shows little of the extensor ridges except their minutely free, blunt extremities forward. The head vertex shows as a narrow band behind the snout; segment 2 as a broader piece with curved front margin (concavity forward), and both head-vertex and major part of segment 2 have their dorsal line parallel to pupal

× 2

longitudinal axis: the hinder portion of segment 2 being included in the front slope of thoracic hump, its hinder margin is straight in the dorsal region; the front slope of thorax is at about 30° to longitudinal axis, ascends to about 2/3 its thoracic length, then, the change being an even curve, descends to front margin of segment 5, segment 4 being included in the posterior slope, which is about the same as the anterior; the hinder margin of thorax is a gentle curve meeting the wing-line in an open, broadly-curved angle of somewhat less than 90°; segments 4 and 5 are about the same length, the latter being in the abdominal dorsal straight line; the segment margins are fairly plainly defined. The *spiracles* of segment 2 are indicated by a longly oval, smooth surface facing slightly forward, formed by the raising of the front margin of segment 3, and is light green; the others are oval, perhaps rather large, more or less flush, whitish. The surface of pupa is slightly shiny, somewhat marbled-rugose, slightly tuberculate on thorax, though, even under lens, there are really no prominent parts except a few small tubercles about shoulders; the head-cone is quite smooth. *Colour* is green or bone-coloured, according to circumstances; when the former the marbling-rugoseness is produced by many irregularly disposed lines and dots which appear greenish under lens; the spot on discocellulars smooth, unlined, conspicuous; indication of a greenish, dorsal, broad line and black, supraspiracular dot to each segment; lateral outline-edge from shoulders to abdomen, continued as a spiracular line, vaguely yellow; cremastral hooklets rusty pinkish; two parallel brownish (whitish in green pupa) fasciæ diagonally across wing from middle of costal margin to just before tornus for one, the other parallel, just behind and touching the discocellular spot. When the pupa is green there is sometimes no sign of these transverse fasciæ, the whole surface is uniformly of one colour, a rather whitish-green, or, perhaps, a trifle glaucous in shade, with the discocellular spot on the wing; sometimes the prominent part of shoulder may be light pinkish-brown; the abdomen marked on segments 9, 10 with a small pinkish-brown patch, which includes the spiracle, and sometimes with a yellowish spiracular band or broad line which starts from the shoulder and runs backwards to meet this patch. L: 15 to 16mm; B: 4·5mm at shoulders, slightly less in middle; H: at wing-bulge: 6·5 mm; at segment 9 immediately after it: about 4·5 mm or somewhat less.

Habits.—The egg is laid, never more than one at a time, on an old leaf or its stalk, or sometimes on a convenient dead bit of stuff near by. The little larva when it emerges, is generally found on the underside of an old leaf of which it eats the epidermis, though it will also eat young leaves—there are often very few on the plant. As the caterpillar becomes bigger it sometimes lies in the middle of a leaf, like any other pierine larva, though it is generally found feeding stretched along the edge; it does not fall to the ground when disturbed quite as readily as that of *C. etrida* or *eucharis*. It turns pink before changing to the pupa. The pupation takes place from the underside of an old leaf near the ground as a rule, or from a stalk or twig, often the loose body-band breaks and it depends from the tail-fixing only which however is so strong that the pupa stands straight out from the surface even when that surface is perpendicular, though the favourite position is from a horizontal surface. The growth of the larva is rapid, the duration of the pupal stage about a week; the butterfly emerges generally in the early morning and flies as soon as ever the sun shows though it is most active in

the hottest hours of the morning, say about midday and from 12 to 2. It flies straighter than the other members of the genus except the male of *C. fausta*; it is really rather a powerful little insect. It rarely rises any distance from the ground however, though it will face large open spaces away from bushes much more readily that *C. amata, etrida* or *eucharis*. It is never found in the jungles and regions of heavy rainfall; it is plentiful in countries like Sind for example. The larvæ are, in common with all others of the genus, very much parasitised by ichneumons, the pupa by flies; a large percentage dying from these causes. Males and females in the butterfly stage are nearly equally plentiful where it occurs like *C. amata* and unlike *C. etrida, eucharis* and *fausta*, of which, generally speaking, the females are comparatively scarce. The foodplants of the larva all belong to the Caper family; it has been bred on *Cadaba indica, Capparis sepiaria* and *divaricata*; and will, no doubt, feed upon any other; also on *Mærua arenaria*. The insect is found in Baluchistan, Sind, Western India, Southern India and Ceylon.

Upon a general survey of the species of *Ixias, Colotis* and *Hebomoia* caterpillars and pupæ, there seems little doubt that the first two genera have much in common and are very closely related—a fact that, besides, seems evident from the general appearance and colouration in the imagines. The pupæ of *Ixias* and *Colotis eucharis* are very like each other. *Colotis danæ* and *Hebonoia glaucippe* larvæ also somewhat resemble each other but, perhaps, hardly sufficiently to indicate as close a relationship as between *Ixias* and *Colotis* generally.

Genus—Hebomoia.

124. Hebomoia glaucippe.—(Pl. J. figs. 66 ♂, 66*a* ♀).—*West-season brood.*—Male, *upperside*: creamy white. Forewing: the costal margin narrowly, the apex and terminal margin to middle of interspace 1, black; an irregular, somewhat sinuous, black band extends obliquely from beyond the middle of costa across the upper apex of the cell and meets, at interspace 1, the black on the terminal margin; within the triangle thus formed is enclosed a rich, orange-red patch that is crossed by the black veins and bears, in interspaces 3 to 6, a postdiscal series of black, inwardly-elongated spots. Hindwing: nearly uniform, touched with black on the terminal margin anteriorly and with a conspicuous, postdiscal black spot in interspace 7; in some specimens one or two smaller spots in continuation of the series in the interspaces below. *Underside*: white; apical third of the forewing and the whole of the hindwing mottled with more or less prominent, brown strigæ and spots; costa of the forewing and a fine line that runs from the base of the hindwing through the cell, straight to the middle of the terminal margin, brown. Antennæ dark brown; head and thorax anteriorly with reddish-brown pile; thorax above greyish-blue, abdomen white with a bluish tinge; beneath: head and thorax more or less brownish, abdomen white. Female: similar to the male. *Upperside*: ground-colour with a slight greenish tinge; the orange patch on forewing more restricted: it consists of a series of broad streaks in interspaces 3 to 6 and 10, the outer apices of which are deeply incised by black, and with a row of hastate, orange spots beyond in interspaces 2 to 6. Hindwing: similar to the hindwing in the male, but with a postdiscal series of large, triangular, black

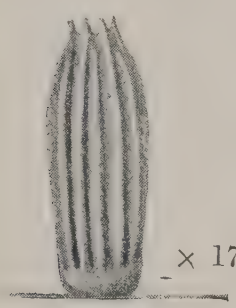
spots and a terminal, connected series of still larger ones at the apices of veins 2 to 7. *Underside*: similar to that in the male, the brown, transverse strigæ and spots are more numerous, the costa of the forewing and the median line on the hindwing very prominently brown. Antennæ, head, thorax and abdomen as in male.

Dry-season brood.—Male and female differ only from the wet-season brood in the slightly more falcate apex to the forewing and in the purer, white ground-colour on the upperside; also the terminal margin of the hindwing in the male has the black markings all but obsolete, while in the female the postdiscal and terminal black markings on the same are smaller than in the wet-season form. *Underside*: the mottlings of brown strigæ and minute spots more numerous and dense. Expanse: 94-100 mm.

There is a race: *australis*, Butler, said to replace *glaucippe* in "Southern India from the Ghauts at Khandalla, south-eastwards to Ceylon" which is distinguished from the typical form, in that the male and female have the inner, black border to the orange patch on the upperside absent; this represented by a few obsolete touches of black scaling. Hindwing: white throughout with only a half-obliterated, subcostal, black spot in interspace 7 in the male; in the female, the postdiscal and terminal series of spots smaller.

In the Kanara district of the Bombay Presidency, however, it is a fact that *H. glaucippe* exists and that forms intermediate between it and *australis* are also found. There is little doubt that the latter is not even a constant *form*.

Egg.—(*v.* marginal figure).—This is three times as high as broad, narrowest at base, gradually increasing in diameter upwards to about $\frac{2}{3}$ the total height, then suddenly narrowing in a curve to apex which is again suddenly narrowed into a low, circular ring of teeth round the micropile. There are 11 or 12 longitudinal ridges which are thin and low, the intervals between each two about equal to the breadth of a ridge, each alternate one reaching the apex of the egg as one of the above sharp teeth, the others disappearing in the surface before the absolute top; colour shiny white when laid, with a pink shade; turning yellow later on.



× 17.

Larva. (Pl. I, fig. 19).—The body is somewhat fish-shaped, having the dorsal half-segments convex, the ventral flattened; segments 2-4 are somewhat depressed and segments 3-4 are laterally broadened out; the anal segment is narrowed, somewhat considerably flattened-depressed, ending square with a slight indentation in centre of extreme margin and it overhangs the anal claspers behind. The body is broadest by far at segment 3. Head much flattened on face, more or less parallel-sided, rounded over vertex and at base; surface covered with transparent, conical, bluish tubercles, each bearing a fine, short seta, margined laterally by a whitish-yellow band in continuation of the subspiracular band of body; it is small for the size of the caterpillar and there is very little neck, the front margin of segment 2 embracing it completely at the back; colour glaucous green. Surface of body conspicuously crossed by 7 parallel, depressed lines on most segments (less on the anterior segments, none on anal segment); the interval between each two of these impressed transverse lines bears a single row of small, cylindrical, translucent, pointed, blue tubercles, each bearing a fine, short, brown seta; there are, besides many smaller, conical tubercles; the tubercles along the subspiracular line on segments 3 and 4 are swollen, resembling beads, adding thus to the tumid, lateral appearance of those segments; the ventrum is smooth. Spiracles small, oval, yellow, situated above the

beaded line and touching it. Colour of body is glaucous-green, lightest in the spiracular region, with a beaded, white, subspiracular line running from hinder margin of segment 13 to the head where it ends at the base of the jaws; the lower half of the leads on this subspiracular line is orange, except on segment 3 where it is blue; through each one of the transverse tubercles (each row of such reaching down to spiracular line on each side) runs a short, longitudinal, purple line, limited at each end by the impressed, transverse lines between which the tubercle stands, this purplish line splitting to let the tubercle in; ventrum and legs, also prolegs, watery green. L: 47 mm; B at segment 3: nearly 8 mm; B of head: 3 mm; the height is greatest at segment 3.

Pupa—(Pl. I, fig. 19*a*.)—The shape is that of *Catopsilia*. The thorax is inclined at a very wide angle to that of abdomen in the dorsal line; ventrally the wing-bulge is not specially great, the anterior side of it (in the ventral, central line) is at right angles to the posterior side, the two joining each other in a curve; the head-snout is conical) at its base, cylindrical in its upper portion, slightly turned up at the point, with a very rugose surface. Wing cases slightly expanded laterally along dorsal wing-margin, diverging slightly one from the other from shoulders backwards so that the pupa is broader at middle than at shoulders; dorsal constriction behind thorax slight, laterally also; shoulders prominent, the pupa being much broader there than at segment 2. Cremaster longly triangular, strong, distinctly bifid at extremity; the extensor-ridges rugose, strong and ventral. Surface glabrous, very finely, transversely rugose under a magnifying glass, the impressed lines irregular. Spiracles of segment 2 hardly indicated; the rest longly oval, somewhat raised, yellow in colour. Colour of the pupa is dark yellowish-green; back purple as well as a lateral band on head, a large dorsal spot on segments 4, 5, 9; the dorsal margin of wings from the shoulders to segment 7 light brown; surface of wings mottled sparsely brown-purple; eyes with a semicircular, black, anterior margin. L: 37·5 mm B: 9·4 mm at shoulders; H at wing-bulge: 12·5 mm.

Habits.—The egg is laid, always singly, on the upperside of a leaf, an old leaf being generally preferred and one close to the ground mostly. The little larva betakes itself at once, after eating the egg-shell, to the base of the leaf where it lies along the midrib with its head towards the point, covering the part where it lies with a good carpet of shining white silk; this bed it enlarges as it grows and often sticks to the same leaf for several stages of its growth. It never eats the bed-leaf but wanders off to the tips of branches in search of its food where it can get tender leaves to eat; it eats mostly in the evenings and mornings and probably at night-time, lying quiet during the day-time and often well hidden in amongst the foliage near the base of the plant. Once the larva is full grown it is not difficult to find as it is so big; there are often two or three on a single plant but as this may be extremely extensive, it is often not easy to find them. The pupation generally takes place on one of the leaves of the foodplant and the chrysalis is always strung from the underside of a leaf well hidden near the ground or close to the stem. The method of suspension is the same as that of *Catopsilia* with a strong tail-fixing and a moderately close body-loop. The larva is not a particularly fast grower. Its position on a leaf is generally

with the fore part raised in the air, the front legs bunched and the front segments made as broad as possible; sometimes the anal claspers are also held free from the sitting surface. The butterfly is the strongest and most powerful flier amongst all the *Pierida*; it is also the largest. It often rests on the ground, goes to damp places in nallas and on roads in the hot months of the year; comes freely to flowers and may always be seen, wherever it exists, where the foodplants are; it is fond of the sun and has the habit of keeping to the same "beat" for a long time, returning over the same ground again and again. The flight is rapid, consisting of strong up-and-down beats of the wings which are hardly ever completely brought together over the back between the strokes, the course in a perpendicular plane would be a series of segments of a circle, the more or lèss convexity depending upon the pace at the time; often the wings are held half closed over the back for quite a considerable interval when descending and this style of flight is mostly assumed when there is more than one insect around and they are playing. The position of rest is with the wings closed over the back, the fore wings brought right down between the hind ones so that only the dark apical part of the former, harmonizing with the dark undersides of the latter, remains visible; when pitched on the ground among leaves or rubbish the insect is, in this position, quite invisible, the colour and pattern blends so well with the surroundings. The foodplants belong to the *Capparidea* and the larva has been found on *Crataeva religiosa* very commonly; also, equally often, upon the large climber *Capparis Moonii*. *Glaucippe* is not exactly a butterfly of the Plains but will be found anywhere in the hills where there is forest and around them on the borders of the open country from sea-level upwards; it is plentiful in regions of heavy rainfall. Its distribution is given as N. E. India, Nepal; Sikkim, Bhutan, Assam; Burma and Tenasserim to the Malay Peninsula, and eastwards through the Shan States in Upper Burma to Siam and China. It would not be wrong, perhaps, to say that it exists throughout India from the Himalayas to Cape Comorin and in Ceylon, &c., wherever there are hills and forests and sufficient moisture.

The genus *Hebomoia* is Indo-Malayan in distribution. There is one other species in British India, namely *H. raepstorfi*, Wood-Mason, from the South Andamans and Barren Island which is differentiated by the wings being suffused with pure sulphur-yellow.

Genus—PARERONIA.

The genus is Indo-Malayan and consists of four recognized species of which two only interest us. The other two are *P. avatar* from Tenasserim, the other *P. ceylanica* from Ceylon (said to occur also in S. India: in the Nilgiris, Cochin and Travancore); the former with the veins not defined with black on the upperside: a very pale blue all over inside the black terminal bordering. *Ceylanica* is probably not a good species but only a variety of *pingasa*.

125. Pareronia hippia.—(Pl. I, figs. 63 ♂, 63a ♀.)—Male, *upperside*: a clear somewhat pale blue; all the veins defined with black; forewing: costal broadly apex and terminal margin very broadly black, this black; on the termen narrowed towards tornus and traversed by a transverse, subterminal series of bluish-white spots that are variable in number; the spot in interspace 3 shifted inwards; sometimes the posterior two spots of the series are all but joined on to the streaks of the ground-colour between the veins. Hindwing: dorsal and costal margins broadly whitish, terminal margin broadly black, especially at the apex the black area covered except at the tornus, with specialized, opaque-looking scales. *Underside*: paler blue, the terminal margins of the wings obscurely fuscous, traversed by a subterminal, very indistinct, transverse series of whitish lunulate spots. Forewing: veins more or less broadly bordered with black, this edging dilated towards the termen: apex broadly, terminal margin decreasingly to the tornus, suffused with a somewhat obscure, pearly-white lustre. Hindwing: the subcostal vein and veins 6, 7 and 8 broadly, the rest of the veins very narrowly edged with black; a very fine, black line in interspace 1. Cilia of both wings very narrow, white. Antennæ black; head, thorax and abdomen fuscous, the thorax clothed with long, bluish hairs; beneath: the palpi, thorax and abdomen pale, silvery bluish-white.

Female, 1*st Form*, *upperside*: black, the markings bluish white; forewing: cell with two streaks, the anterior one from extreme base, the posterior one from end of basal third but extending beyond the anterior streak; below and beyond the cell: a series of streaks in the interspaces; the streaks very irregular in length, that in interspace 1 the longest, angulated anteriorly and divided longitudinally from near the base, the streak in interspace 3 short and broad, forming an elongate spot, those in the anterior interspaces more or less obliquely placed; beyond these streaks follows a subterminal, transverse series of spots of which the spot in interspace 3 is shifted inwards and those opposite the apex curved backwards. Hindwing: costa and dorsum broadly white; cell and the interspaces beyond with a series of streaks and subterminal spots more or less as in the forewing but more regular, the streak in cell and interspace 1 divided longitudinally, the subterminal series of spots evenly curved. *Underside*: similar to the upperside, but the ground-colour dull, dusky and diffuse, the markings broader but less clearly defined: the apical area on the forewing obscured by a powdering of whitish scales. Antennæ, head, thorax and abdomen much as in the male, but darker; eyes bright green when alive.

2*nd Form*.—Very like the first, the markings of both sides similar, but the ground-colour on the upperside of the hindwing at base in interspace 1a, over the whole of interspace 1, area of cell and at base of interspace 2 suffused with bright yellow. On the underside the same areas are dull ochraceous. The extent of the bright yellow colour on the upperside and the dull ochraceous tint on the underside is variable, in some specimens more restricted, in others it spreads further towards the costa. This form does not appear until the end of the rains: in a brood of, say, fifteen, of which 7 are females, 1 or 2 may occur with these yellow markings. Expanse 70-80mm.

Egg.—In shape a pointed oval, narrowly truncated at apex, a little less so, perhaps, at base, the apex crowned in a small circle with 8, sometimes 7, pointed, little teeth; the interior of this circle is flat: the teeth are the end of longitudinal ridges which start at the base of the eggs: there are 17 of tehse ridges but about half of them, from 8 to 9 that is, join others and loose themselves in them near the top of egg and, therefore, never reach the crown; these ribs are minutely beaded, a single row of beads, throughout their lengths and the intervals separating them from each other are about

double as broad as they are themselves. The surface of the egg is shiny and the bottoms of the intervals are quite smooth, not cross-rayed. The colour is whitish when first layed, later with four, faded-rose coloured bands, parallel to each other, the first just below the apex, the fourth at a distance of 1/4 the height of egg from base. H : nearly 2mm.; B : 0·6mm.

Larva.—The larva is very similar to that of *P. pingasa* described below, the points of anal segment perhaps slightly less developed, the brown patches on the spiracular area of segments 5 and 12 in that species wanting here ; on the whole the larva is less marked than in that species. The 1st stage, immediately after it emerges from the egg is as follows :—Shape subcylindrical, thickest in the middle ; thinning slightly to both ends ; the anal segment square, dorsally flattened, with a conical, fleshy, finely-haired process or point from each hinder angle of flap (extremity of larva), these points being divergent and directed horizontally backwards. Head about the same breadth as segment 2, round in shape, with a triangular clypeus of ordinary size ; surface shiny, covered with some 40 longish, white, erect hairs; jaws and area about eyes reddish-brown ; colour of head green. Surface of body surface shiny, with three impressed, transverse. parallel lines to each segment ; each segment with the usual tubercles, one subdorsal, one dorsolateral, one supra-and one subspiracular, rather large, white and covex, each bearing a single, white, fine hair about equal in length to one of the segments ; on segment 13 the arrangement of tubercles is the same as for segments 5-12 ; segments 3, 4 have them all in a central row as usual ; segment 2 has a row of 10 hairs along front margin. The spiracles are small, whitish ovals. The colour of larva is green (at the end of first stage ; yellowish immediately on emergence), with a mottling of blackish along the lateral region ; anal points yellowish-fleshy at base ; these points are at this stage as long as one of the segments of the body ; but they decrease in size with each moult. Size of egg-larva at end of 1st stage is L.: 5mm ; B: 0·7mm.

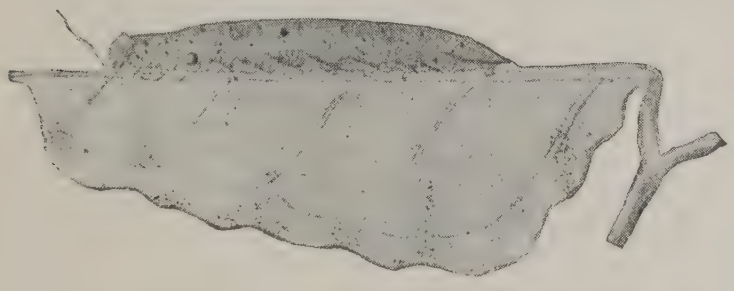
Pupa.—There is not much by which this can be distinguished from the pupa of *P. pingasa* which is described in detail below ; in shape and colour and markings they are extremely similar.

Habits.—The eggs are laid in batches of six and more in number on the upper surface of a leaf, close together though more or less without order. In this *N. hippia* differs from *pingasa* for the latter always lays the eggs singly, never more than one on any one leaf. The habits of the caterpillar and of the imago are very similar to those described under *pingasa* but the butterfly is found in much opener places than this latter species. While *pingasa* frequents heavy jungle, *hippia* is never found there, although there may be but a few miles distance between the two places ; the latter is much more of a sun-loving insect than is *pingasa*. In the Kanara District, for example, the present species is found all along the bases of the hills not a mile from the sands of the sea-shore where the jungle is scrubby and moderately open, consisting of deciduous trees ; the other does not leave the evergreen, shady jungles a mile or less away, stretching up on to the tops of the hills above to a height of close on 2,000 feet, and here, even, it keeps to the cover of the undergrowth. The food-plant of *hippia* larva is *Capparis heyneana*, the same as that of the other ; but it is extremely probable that it will eat other Capers also. *Pareronia hippia* is found nearly throughout Continental

India except in the desert tracts; in Assam, Burma and Tenasserim, extending to the Malay Peninsula.

126. Pareronia pingasa.—Resembles *P. hippia*, Fabr., in colour and disposition of markings, but differs as follows:—Male, *upperside*: ground-colour a deeper blue. Forewing: the terminal, black border much broader, generally entirely without the transverse, subterminal series of bluish-white spots; in a few specimens there are one or two of these spots present, but nothing like the series so conspicuous in *hippia*. Hindwing: the terminal, black border very broad, narrowing distinctly, though slightly towards the tornal angle. Proportionally this border is even broader than in the forewing. *Underside* as in *hippia*.—Female closely resembles the female of *hippia*, but on the *upperside* the outer, black margins beyond the discal markings of both wings are proportionately much broader; the transverse, subterminal series of spots that crosses the wing is further from the terminal edge. On the *underside* the black, terminal borders are broader and darker, the subterminal series of spots on the apex of the forewing and on the hindwing absent, or so very thickly overlaid with the dusky brownish-black of the terminal margin as to be very indistinct and blurred. Antennæ, head, thorax and abdomen as well as eyes as in *hippia*.

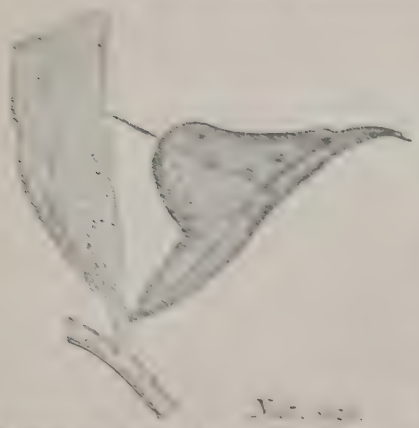
Larva—(*Vide* marginal fig.).—Body cylindrical, shortly erect-haired, with distinct, impressed, transverse, parallel lines to each segment as usual; widest at middle about segment 7, narrowing gradually to tail-end, considerably less towards head; anal segment dorsally flattened, somewhat slightly constricted about middle, and produced behind into two short, diverging points which are close together and separated by a concave sinus: both are set with hairs and reach well beyond the anal claspers. Head round, somewhat flattened on face; surface finely rugose, set with fine, light hairs; eyes black; the whole head a slightly lighter green in colour than the body. Segment 2 slightly narrower than head. Surface of body smooth with the usual tubercles to each segment hardly perceptible, each bearing a single, small, erect seta or hair: subdorsal, dorsolateral, supra and subspiracular. Spiracles oval, black except those of segments 2, 11 and 12 which are larger and yellow in colour, bordered thinly with black. Colour of larva is dark-green, each tubercle a small, brown spot except the subspiracular ones which are green like the body; the tubercles of course arranged on segments 5-13 as usual: the subdorsal near front margin, the dorsolateral nearer the hinder margin, the others central; segments 3, 4 with them all central in a row; segment 2 with them along front margin; from behind each spiracle a diagonal, chequered, brown band runs up and forwards on to the preceding segment; this band varying in intensity of colour in different individuals; on segments 5 and 12 a large, spiracular patch of brown with two or three white spots on it: these patches fading before pupation; tail-points brown, connected spiracularly with patch on segment 12 by a brown line; true legs red-brown. L: 41 mm; B: 6 mm; H: 5 mm.



Nat. size.

Pupa—(*Vide* marginal fig.).—Shape as in figure in margin. Head slightly convex dorsally and ventrally; vertex small; segment 2 dorsally convex

like head: the latter produced out in front into a long snout, circular in section, sharp at extremity, much upcurved; this snout is as long as the head, segment 2 and half of segment 3 together. The part of pupa composed of segments 5-14 is bent back at right angles to the portion made up of snout and segments 1-4 so that the dorsal line of the former portion is at right angles to the dorsal line of the latter (or nearly so), the wings being produced out ventrally into a very prominent bulge or curve, parabolic in shape, the line of junction of the wings rounded, their surfaces flat, the one leg of the parabola being the ventral line of pupa gradually diverging from the longitudinal axis of pupa from front to about opposite segment 7, where is the apex of the bulge, whence the other leg descends again to join the abdominal, ventral line at hinder margin of segment 8; thorax broadest at shoulders, whence the pupa is parallel-sided to end of segment 7; dorsally the thorax is somewhat humped; the lateral constriction where the body loop passes at segment 5 is slight; the transverse section of abdomen dorsally is triangular, ventrally is an arc of a circle, so that the dorsal line of it is slightly keeled; the cremaster is parallel-sided, rather flattened, concave as to hinder margin. Colour of pupa is a dull, light green, somewhat glaucous, darker on wings which have a black, discocellular splash and some small, brown spots; a dark, dorsal line and a yellow, supraspiracular line; a black postspiracular spot on each segment, slightly below the spiracle; a yellow, dorsolateral and subdorsal spot and a large, black mark under the subspiracular spot of segment 8. L: 30 mm.; B: 6 mm. at shoulders; H: 13 mm. at apex of wing-bulge; L. of snout, 3 mm.



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Habits.—Egg always laid singly. Larva lives generally about the stalks when full-grown but rests on the undersides of leaves in the earlier stages. It covers the leaves, stalks and small twigs of the food-plant with a silvery coating of web which looks like a snail's slime; eats the leaf on one side of the midrib first, then on the other, leaving the rib intact; it starts from the base of the leaf and rests along the eaten edge, that is on the midrib and eaten part, and generally finishes off the leaf by eating the softer part, the tip, of the rib itself before betaking itself to a new one. It walks in a slow, halting fashion, eats continuously and wanders often long distances before pupating. The pupa is always attached to the underside of a leaf or thin twig; it takes about 30 hours from the time the larva has finished suspending itself to the formation of the pupa. The places chosen for deposition of the eggs are always shady, cool and often very close to the ground; invariably in big jungles, mostly in evergreen parts and over 1,000 feet above sea-level as a rule. More minutely, the position chosen is the upperside of an old leaf, the end of a thorn or a little dry twig. The egg is just like that of *Ixias*. The butterflies are quite strong fliers but keep always to the shade of the undergrowth and are not often seen in the full glare of the sun or in the open; they fly straight ahead with

an even, continual up-and-down motion of the wings above the horizontal; the females are not so often seen as the males but may be found sitting oftener than the males, generally on a leaf, above or below, always with the wings together over the back, the fore-wings hardly at all drawn into the hinder ones. The insects do not seem to go much to flowers and are never found at water. The females may be caught when fluttering about in the underwood laying eggs; the males must be taken in their flight; and it is not always an easy thing to get them, for they are good at dodging and have plenty of trees to facilitate their escape.

The female of this butterfly is not quite such a strong, active insect as the male or, at least, is never found flying in the same way, she is generally seen fluttering around in the underwood. She is rather like a *Danais aglea* at first sight, the wings being marked in a similar manner, though of course they are rather different in shape; the green eyes, however, at once give her away. These fade after life is extinct, in a very few days becoming a reddish brown.

The food-plant of the larva is *Capparis heyneana*, the same as that of *hippia*; it is a thorny, scandent bush generally found in the evergreen-forest regions of the Western Ghats in the Bombay Presidency. It is a common species.

P. pingasa is found in Kanara, the Nilgiris, Mysore, Malabar, Cochin, Travancore and the South Andaman Islands. The other species, *P. ceylanica*, inhabiting Ceylon is supposed to be distinguished from it by having the "terminal black border not of even width throughout, distinctly narrowed posteriorly." The Kanara specimens do not all absolutely tally with the description given for *pingasa* or that of *ceylanica*.

(To be continued.)

SOME NOTES ON THE BIRDS OF THE KAGHAN VALLEY, HAZARA DISTRICT, N.-W. FRONTIER PROVINCE.

BY

CAPT. C. H. T. WHITEHEAD.

Colonel Bingham, C.B., has already given a very long list of the birds of Hazara in the interesting Gazetteer of that District; but as he did not visit the Kaghan, a certain number of species more or less confined to that valley were omitted. I append :—

I.—Additions to the above list.

II.—Some nesting and other notes on some of the species met with.

The Kaghan Valley is the most northern strip of British India. It lies to the north of Abbottabad wedged between Kashmir on the east and Tribal territory on the west, varying in elevation from 5,000 to over 17,000 feet, and is some 60 miles in length. The main road from Abbottabad to Chilas and Gilgit traverses it.

The numbers in front of the scientific names refer to "*The Fauna of British India Birds*," by Oates and Blanford.

155 species were met with in all between 17th May and the 31st July (viz. a month in 1908, 7 weeks in 1909, 6 weeks in 1912), but as most of my time was spent above 9,000 feet, many must have been missed.

Mr. E. C. Stuart Baker and Doctor C. B. Ticehurst have very kindly identified my specimens at the British Museum and Tring.

I.

Additions to Colonel Bingham's List of the Birds of Hazara.

[illegible]. *Hydrobasileus albigularis*.—White-throated Dipper.

[illegible]. *Enicurus schistaceus*.—Hodgson's Black-crown.

[illegible]. *Molpastes atricapillus*.—Punjab Red-vented Bulbul.

(Common in Abbottabad).

[illegible]. *Amythinus regulus*.—Kashmir Wren.

[illegible]. *Acrocephalus stentoreus*.—The Indian Great Reed-Warbler.

[illegible]. *Acrocephalus dumetorum*.—Blyth's Reed-Warbler.

(Noted in Abbottabad, May 16th).

367. *Acrocephalus agricola*.—Paddy Field Reed-Warbler.

368. *Tribura major*.—The Large-billed Reed-Warbler.

406. *Phylloscopus affinis*.—Tickell's Willow-Warbler.

408. *Phylloscopus tytleri*.—Tytler's Willow-Warbler.

416. *Phylloscopus subviridis*.—The Brooks's Willow Warbler.

512. *Oriolus police*.—The Black-headed Oriole.

(Identified by Bonney from the Gaila, see Vol. XVI (II, p. 436.)

589. *Alseonax latirostris*.—The Red-tailed Flycatcher.

639. *Parisoma fruticula*.—The Blue-throated Red-start.

651. *Calliope pectoralis*.—The Himalayan Ruby-throat.

654. *Saxicola leucura*.—The Red-backed Black-Robin.

666. *Merula maxima.*—The Central Asian Black bird.
675. *Merula ruficollis.*—Red-throated Thrush.
(One shot by Mr. D. Donald, C.I.E., out of a host of *M. atrigularis* in a jhil in February 1911.)
Oreocincla whiteheadi.—sp. n. The Kaghan Mountain Thrush.
708. *Cinclus kashmirensis.*—The White-breasted Dipper.
712. *Accentor nepalensis.*—The E. Alpine Accentor.
719. *Tharrhaleus jerdoni.*—Jerdon's Accentor.
743. *Pycnorhampus carneipes.*—The White-winged Grosbeak.
753. *Pyrrhospiza punicea humii.*—Red-breasted Rose-Finch.
754. *Propasser thura.*—The White-browed Rose-Finch.
768. *Callacanthis burtoni.*—Red-browed Finch.
823. *Hirundo erythropygia.*—Sykes's Striated Swallow.
(Common in Lower Kaghan—one shot).
850. *Anthus rosaceus*—Hodgson's Tree Pipit.
856. *Otocorys longirostris.*—Long-billed Horned Lark.
1004. *Indicator xanthonotus.*—Yellow-backed Honey Guide.
(Observed at Donga Gali.)
1072. *Cypselus leuconyx.*—Blyth's White-rumped Swift.
1210. *Hiräetus pennatus.*—The Booted Eagle.
1230. *Milvus melanotis.*—Large Pariah Kite.
1296. *Columba leuconota.*—The "Snow" or White-bellied Pigeon.
1380. *Lerwa nivicola.*—The Snow Partridge.

II.

38. *Ægithaliscus niveigularis.*—White-throated Tit.

Is not common. I only met it with twice, once above Bhimbal and again a party in Manúr Katta. Habits appeared similar to those of the Long-tailed Tit. Call very like the gold finch's "wi." 2 preserved and sent to the British Museum.

199. *Hodgsonius phœnicuroides.*—Hodgson's Short-wing.

Is found sparingly throughout the valley from 7,500 to 9,500 feet, wherever there is forest with suitable undergrowth. It has a pleasing song usually sung from the midst of a thick bush. Its call resembles the words "He did so" rather like *Ianthia rufilata*. An intruder to the nesting area is at once greeted by its harsh alarm notes accompanied by much flirting of the tail. A nest found near Batta Kundi was built near the ground in a patch of Kanúla (*Sambacus ebulus*). It reminded me very much of a Nightingale's but more solid. The eggs are plain deep sky-blue.

320. *Sitta kashmirensis.*—Brook's Nuthatch.

Brook's Nuthatch is common locally. This species plasters up its nesting hole with mud like the common Nuthatch.

323. *Sitta leucopsis.*—Chestnut-bellied Nuthatch.

My shikari discovered a nest of the White-checked Nuthatch with 3 eggs *in a hole in the ground* below the root of a standing Silver Fir, an unusual situation, I believe.

358. *Regulus cristatus.*—Gold Crest.

Is not uncommon near the upper tree limit.

Its single shrill much repeated call-note and its characteristic way of hovering in the air under a branch (apparently to take insects) distinguish it at a distance from other small warblers.

Only one nest was found. it was placed 30 feet up in a paluda in a typical situation. It contained 3 young ones and one addled egg. The latter was white with large dark red spots—very different from the normal type—but Colonel Buchanan who has seen many nests tells me that the white heavily-spotted type was the one he has usually met with out here.

367. *Acrocephalus agricola concinens.*—Chinese Paddy Field Reed-Warbler.

This bird has not I believe been previously recorded from British India. True *A. agricola* breeds in the reed beds of Kashmir. But further west this race, curiously enough, appears to be the common one, large numbers passing through Kohat on migration and many stay to nest in the Kaghan. Unlike typical *agricola* it nests in undergrowth (Kanúla) on the hill side far from water. Feeling doubtful of its identity I shot several on their return to their nests. Both Dr. Ticehurst and Mr. Stuart Baker agree that they are typical specimens. It starts nesting at the end of June—7 nests with eggs were found in all. Both nest and eggs resemble those of *A. stentoreus* but the nest is much neater and built within a few inches of the ground. It is usually woven round 4 stalks (in one case 3) in true reed warbler fashion, composed of stems and grass, neatly lined with roots, and in some cases with an edging of green grass woven round the top of the cup.

The cock-bird at this season throws off his skulking habits and may generally be seen in a conspicuous position singing his high pitched squeaky song accompanied by much craning of the neck and erecting of the feathers of the crown.

369. *Tribura major.*—Large-billed Bush-Warbler. The Large-billed Bush-Warbler or the "tick-tick pitta" as it is appropriately dubbed locally from its notes.

Only observed near Batta Kundi where it breeds. The song is very like that of the Grasshopper Warbler. Nest and eggs of usual type, this bush-warbler is an adept at skulking, it can seldom be induced to fly off its nest. Instead of slipping off it runs mouselike away at an amazing speed taking excellent cover all the way.

406. *Phylloscopus tytleri.*—Tytler's Willow Warbler.

Occurs in pine and paluda forest from 9,000 feet to tree limit but is not common. The nest is particularly difficult to find. I chanced on one at 9,800 feet built 30 feet up in a Blue Pine—it was of the usual domed type but very frail, composed of grass lined with feathers and hair. Eggs as previously described. The hen was shot and proved to be typical (now in British Museum).

416. *Phylloscopus subviridis.*—Brook's Willow Warbler.

Has a most peculiar song (*pi-pi-pi-az-z-z*) which at once distinguishes it from all other species. In my notes on the Birds of Kohat, etc. (see Vol. XX, No. 1, p. 191). I incorrectly ascribed this song to Humes's Willow Wren as I shot one, in the act as I thought, of singing this song, whereas *P. subviridis* must have been there too well under cover as usual when *P. humii* foolishly exposed himself close by. Occurs in the forest from 9,000 feet upwards, but is rather scarce.

639. *Ruticilla frontalis.*—The Blue-fronted Red start.

Is fairly numerous from 10,000 to 13,000 feet on open hill sides. A nest with 4 eggs was found at 12,000 feet was neatly made of grass well-lined with moss and feathers and placed in a hollow in the ground. Many nests with young and one or two in the building stage were also found.

Alarm note—ee-tit tit, very robin-like alarm.

644. *Ruticilla rufiventris.*—Indian Red start.

Is one of the commonest birds of the valley above 8,000 to 13,000 feet. Eggs as described by Marshall, *i. e.*, very pale blue.

651. *Calliope pectoralis.*—The Himalayan Ruby-throat.

Is abundant from 9,000 feet up to 14,000 feet at least. A nearly fledged Cuckoo was found in one nest attended by its minute foster mother. A lizard's tail being one of the delicacies provided! In another nest above Gitti Das at 13,000 feet a pale sky-blue Cuckoo's egg (unmarked) was

taken, this is interesting in view of Stuart Baker's and Major Magrath's notes on blue eggs of this species, *vide* Vol. XVIII, p. 261.

Oreocincla whiteheadi, sp. n.—The Kaghan Mountain Thrush.

Mr. Stuart Baker described this new species at a meeting of the B. O. C. on the 14th May 1913. "Adult, nearest to *Oreocincla molissima* (Blyth), but differs in having the whole upper plumage olive-grey instead of rich olive brown with a strong rufescent tinge; underparts also without any of the bright rufous tint, which is always present to a greater or less extent in *O. molissima*, though there is a very slight tinge of ochre on the breast of one of the adult birds; the whole crown of the head is strongly marked with pale shaft stripes, a character never present in the adult of *O. molissima*. Bill from gape 28·4 mm., from feather of forehead, 21·6; wing 142·5—150; tail 95·4—98: Tarsus 30·4. Younger examples shew the same comparative differences as are shewn in the adults, *i. e.*, they are much less rufous both above and below; they are also much more strongly striated and have the dark margins of the feathers of the upper parts more conspicuous."

Mr. Stuart Baker added that *Oreocincla molissima* and *dixoni* are inseparable. Their range, *viz.*, Chamba to the Shan States is identical and there is no constant difference between the two.

(Bulletin of the B.O.C., Vol. XXXI, No. 188, dated 28th May 1913.)

I found this fine thrush comparatively common in one wild precipitous valley, the home of several other rare species such as the Snow Partridge (*Lerwa nivicola*).

It differs from *O. molissima* which is a forest bird, in inhabiting bare rocky slopes above tree limit between 12,500 and 14,500 feet and in nesting in clefts in cliffs. Its alarm notes are similar to those of *Merula maxima* (like a policeman's rattle) which occurs on the same ground at a slightly lower level; also the single call-note. I was too late in the year for the song. One brood just flown I found on 12th July on a snow slope, the parents busily feeding them. Another on the 14th not yet flown in a cliff. Once the young can shift for themselves it becomes very wild and difficult to approach. The broad white bar edged with black under the wing distinguishes this thrush from afar from all other species occurring here.

The ♂ and ♀ are very similar in colouring.

753. *Pyrrhospiza punicea humii*.—The Red-breasted Rose-Finch.

Another scarce species from the same valley where it is common between 12,000 and 14,000 feet. Both ♂ and ♀ exactly answer to Sharpe's description of this subspecies which is now generally recognized. It has a cheery Bulbul-like call-note which may be rendered "*are you quite ready.*" The male constantly sings short snatches of a soft, erratic warbling song.

The only nest found was being built on a ledge on a cliff and not in a bush as described in the "Fauna of B. I. Birds." Like other rose-finches this species feeds a lot on flowers and buds.

The colour of the soft parts except the bill are not recorded by Oates, they are as follows :—

Bill light horn brown, *lower mandible* whitish. *Tarsus* black. *Iris* hazel.

820. *Motacilla personata*.—The Masked Wagtail.

Breeds in small numbers along the river from 3,000 to 9,000 feet. A nest found at 8,800 was built on an island in a torrent under a bush, and contained 5 eggs of the usual type.

I looked out carefully for *M. hodgsoni* but did not see a single bird.

838. *Motacilla citreoloides*.—Hodgson's Yellow-headed Wagtail.

Abounds from Narang (7,700 ft.) upwards and breeds freely; the male generally in mature plumage and the female in one of 2 plumages, *viz.*, (1) above grey with scattered black feathers; supercilium and below yellowish white, (2) above dark grey with some black feathers; forehead, supercilium

and under part canary yellow. The latter appears to be the adult female, for apparently they never assume, except perhaps as a freak, the adult males garb. The former is probably the female in the first year. This is the opinion of Dr. C. B. Ticehurst, who kindly went through the series of this species which I sent home and afterwards exhibited them at the B. O. C. Meeting on 9th April last, and also of Mr. Stuart Baker.

850. *Otocorys longirostris*.—The Long-billed Horned Lark.

Is not uncommon near the head of the valley above 11,500 feet. The nest is merely a hollow scantily lined with grass and vegetable down. Nine nests in all were found with eggs. The full clutch is 2, and occasionally 3. The eggs are pale stone-coloured and small for the size of the bird.

Whilst watching the first nest, the hen returned and at once set to work to remove the eggs by rolling them carefully down the slope with her bill. This also happened at another nest.

This lark is extremely hardy, by mid June many clutches had already been hatched out even up at 13,000 feet where clear of snow. On June 20th, on the top of the Babusar Pass 13,580 feet a blizzard swept spot, we found a nest containing 3 young—2 of these were dead, evidently killed by the blizzard which had been raging for 12 hours almost on end—the parents were still busily getting food for the survivor.

Some 5 yards from another nest was found a single egg not one of the Larks as it was smaller and nearly glossless. It must, I think, be a Cuckoo's (*C. canorus telephonus*) as this species was very common in those parts.

The young are plain brown above, spotted with fulvous brown, otherwise resembling the adult ♀.

Alarm note—a whistling *peo* or sometimes *ee-up*.

In nestlings the gape was orange with one black spot on the top of the inside of the lower mandible, another on the tip of the tongue and a kidney-shaped one in the centre of the tongue.

1104. *Cuculus canorus telephonus*.

The cuckoo is abundant up to 14,000 feet. I was surprised to find several calling above 13,000 feet where everything was under snow as early as May.

At the higher elevations they appear to continue calling to a later date. They were still cuckooing on July 14th when I left the head of the valley but none were heard lower down.

I found a young cuckoo in the nest of the Himalayan Ruby-throat (*Calliope pectoralis*), and in another nest of the same species got a pale blue cuckoo's egg about double the size of the Ruby-throat's and much paler.

Stuart Baker does not mention this species among the list of the foster parents of the Cuckoo (B. N. H. S. J. Vol. XVII, p. 78 and p. 881). I also suspect an egg found outside the nest of a Long-billed Horn Lark belonging to this species. A rufous female I shot containing a half-formed egg is now in the National Collection.

1208. *Hieraetus pennatus*.—The Booted Eagle.

Is not uncommon in summer in the Western Himalayas at least as far East as the Sutlej Valley, though it is only supposed to be a winter visitor (*vide* Fauna of India).

A nest was found at 10,000 feet on 22nd June. It was a huge platform of sticks lined with green pine-needles on the top of a Blue Pine (*Pinus excelsa*). It contained a single plain white egg. There were 2 holes* in it and the contents were nearly dried up. However the female was still incubating it. As I could not satisfactorily identify her, I was obliged to shoot her (the skin is now in the British Museum).

* Mr. S. L. Whymper has had a similar experience with Eagle's eggs and believes that it is due to their removing or trying to remove them from their nests (Vol. XVIII, p. 187). Or perhaps it is due to their leaving their nests in a great hurry.

Mr. Stuart Baker has only heard of one other nest being found in India, *viz.*, in Kashmir by Mr. Crump, Col. Ward's Collector.

It utters weird cries at this time of the year, one series is rather like the call of the Himalayan Pied Woodpecker but more musical, varied, and proportionately louder and on the wing it goes through wonderful evolutions, and give vent to more striking whistling notes.

1260. *Falco subbuteo.*—The Hobby.

I was surprised to find a Hobby's nest on the ridge above Jabba on 18th May. It seems to be a very low elevation (= 3,800 ft.) for this species.

1380. *Lerwa nivicola.*—Snow Partridge.

I only met with the Snow Partridge (native name Părahút) in one valley, but there it was comparatively common between 12,500 and 14,000 feet. I have never seen such a delightfully tame, inquisitive game bird. Its musical whistling call was constantly heard. On July 2nd I caught a family of 5 chicks, but unfortunately they proved too delicate to rear. Next day I stumbled on a hen sitting on 3 eggs. There was no nest, just a hollow unlined scraped under a bush. This differs from those found by Whymper (Vol. XIX, p. 960) in there being no nest and in not being placed on a cliff (the ground however was very precipitous). The eggs were cream coloured spotted all over with red.

On returning to this spot in 1912, I only found a single pair after a prolonged search and the shepherds assured me that there was only one other pair left in the valley. This is the result of there being no bird or even game preservation laws for the breeding season in these parts. Its confiding habits at this time of the year make it an easy prey.

A LIST OF GRASSES FROM AHMEDABAD AND SURAT

With notes on their habitats, ecological relations, and time of flowering.

BY

L. J. Sedgwick, I.C.S.

These notes are based on observations made at Surat during the rains of 1912 and at Ahmedabad during the rains of 1913. Consequently the areas worked are (1) the immediate neighbourhood of Surat City on the south side, say, the area contained in the southern quadrant of a circle drawn with a 6-mile radius from Nanpura, and (2) the immediate neighbourhood of Ahmedabad, say, an entire circle drawn with a 5-mile radius with its centre at the Delhi Gate. A few species are recorded from the eastern parts of the Surat and northern parts of the Ahmedabad districts. But for the most part the records are from the above-mentioned areas. The authorities used are Lisboa's Monograph on Bombay Grasses and Cooke's Flora of the Bombay Presidency. The latter, which is really a very fine work, is the foundation of a record of the distribution of plants in this Presidency which will require revision from time to time in the future in order to incorporate the results of new observers, as well as to correct some of the descriptions which err occasionally through want of fresh specimens for examination. In no point is the treatment of the order *gramineæ* more incomplete than in the accounts of the distribution of the various species. It is apparent that Professor Cooke had to base his accounts of distribution on the recorded habitats of the specimens in the herbaria of about four or five collectors only. In very few cases has he ventured to describe a grass as being "common" either throughout the Presidency or in a particular area. Among recorded habitats Gujerat figures very rarely, for which reason the present list may be of use to future workers. And it will be noticed that five species are entered in this list which are not given by Cooke as denizens of the Presidency. From the fact that among these is *Chloris virgata*, Sw., which is one of the most abundant and hardiest of grasses in Gujerat the reader will realize what a lot of additions to Professor Cooke's Flora must be expected in the future. In this connexion I would like to throw out a suggestion that the Society might undertake the compilation of a catalogue of plants on the lines of the London Catalogue, in which after dividing India into botanical provinces, each with a separate member, the numbers of the provinces in which each plant has been recorded up-to-date would be entered against the name of the plant. Those who are acquainted with the London Catalogue are aware of its usefulness to field botanists, both

as fixing nomenclature and as affording a bird's-eye view of the distribution of species.

The specimens recorded in this list have been in all cases of doubt identified for me by Mr. R. K. Bhide of the Agricultural College, Poona, a recognised authority on Indian grasses; and my thanks are due to him as well as to Dr. H. H. Mann and Mr. W. Burns for advice and assistance from time to time.

In the accompanying list the ecological associates of the various species are mentioned whenever they are sufficiently certain and obvious. Besides this I have distinguished the following types of prevalence :—*Dominant* (D.), in the case of those grasses which are sufficiently powerful to form the basis of the vegetation over fairly large tracts of, say, an acre or two; *subdominant* (SD.) where the species is too slender or delicate to form the basis of a vegetation, but is sufficiently powerful to occur in patches of, say, a square yard or two here and there, or to straggle erratically in lines or veins, and *sporadic* (Spor.) where the species is so slender as to occur only as single plants whether commonly or rarely. Of course the large majority of plants are sporadic in the above sense, but in every type of vegetation there must be a dominant form, and grasses owing to their hardiness more often furnish the dominant species than any other natural order.

The nomenclature followed is that of Cooke, except in the case of the hitherto unrecorded species, where I have entered the names as given by Mr. Bhide from Hooker's Flora of British India. These species are marked with an asterisk.

Cultivated species and garden escapes are not mentioned.

1. Pennisetum, Pers.

1. *P. cenchroides*, Rich.

Very common at Ahmedabad in association with *Cenchrus biflorus*, Roxb. These two form the principle early fodder both in compounds and on the borders of fields. Cooke's date of flowering (December) is quite wrong so far as N. Gujerat is concerned, where they flower in June and July. (D.)

2. *P. setosum*, Rich.

An alien, only observed in the grass plot at the Bhadar, Ahmedabad, where famine grass had been stored in 1911-12, and so probably seeded from that grass.

3. *P. pedicillatum*, Trin.

An alien, in the same circumstances as *P. setosum*.

2. Cenchrus, L.

1. *C. biflorus*, Roxb.

Abundant at Ahmedabad in association with *Pennisetum cenchroides*, Rich. (q. v.). Very hardy and flowers spasmodically right through the dry season. (D).

2. *C. catharticus*, Delile.

Common in all sandy wasteland, sandy fields and riversides at Ahmedabad. Flowers mid-monsoon. The spikelets of this grass, which are easily detachable from the rachis and are viscid, are most troublesome when walking, as

the leaves of the involucral are closely ranked and somewhat sheathing (Sprl.).

3. Setaria, Beauv.

1. S. glauca, Beauv.
Common at Surat. (SD.)
2. S. verticillata, Beauv. et Schult.
Surat and Ahmedabad. Fairly common at Surat. (SD.)
3. S. pertusa, Beauv.
Surat and Ahmedabad. Fairly common in hedges at Ahmedabad, especially where the soil is good. Flowers mid-summer. (SD.)

4. Andropogon, Beauv.

1. A. citriodorus, Beauv.
Fairly common at Ahmedabad on roadsides and the edges of fields. Flowers mid-summer. (Sprl.)

5. Panicum, L.

1. P. hordiforme, Retz.
Common both at Surat and Ahmedabad in rich soil especially in compounds. Flowers mid-summer. (SD.)
2. P. paniculatum, Linn.
Banks of the Chandola Canal, Ahmedabad. (SD.)
3. P. colonum L.
Ahmedabad, Surat and Ahmedabad, everywhere except the earliest soil. Flowers throughout summer. (D.)
4. P. [illegible], Roth.
Occasional in compounds and fields, Surat. [Sprl.]
5. P. grossarium, Lamk.
Common, Surat. (SD.)
6. P. subjugum, Roth.
Common, Surat and Ahmedabad. (SD.)
7. P. [illegible], Roth.
In rich manured soil in compounds, Ahmedabad. (SD.)
8. P. [illegible], L. (vide B. K. Birds.)
Occasional on sandy uplands among other taller vegetation, Ahmedabad, west of the town. Flowers mid-summer. Sprl.)
9. P. villosum var. hirsutum, Lamk. (vide B. K. Birds.)
Very common at Ahmedabad on all well-drained ground which is liable to accumulation of water during the monsoon, but is not low enough to form a moist, often in association with small bulbous bushes. It is a rather a distinct grass on the [illegible] with all cultivated. Flowers throughout summer. (D.)

6. Digitaria, Heist.

1. D. sanguinalis, var. ciliaris, Prain.
Abundant everywhere, Surat and Ahmedabad forms the principle ingredient of the local bulls of grass grown brought in during the middle and end of the monsoon. (D.)
2. D. Ischaemum, Prain.
One specimen found in a compound at Surat. This grass has hitherto been held to occur only in the hills. Unfortunately no ripe plant was observed to warrant its inclusion to be a [illegible] of Surat, and may have been a casual.

7. Papsalum, L.

1. *P. distichum*, L.

In the Victoria Gardens, Ahmedabad. This may be an alien imported with garden seeds.

8. Eriochloa, H. B. et K.

1. *E. polystachya*, H. B. et K.

Wet places, Surat and Ahmedabad. Especially common along the banks of the Chandola Canal, Ahmedabad, in association with *Panicum punctatum*, Burm (q. v.). Flowers mid and late monsoon. (SD. or almost D.)

9. Saccharum, L.

1. *S. spontaneum*, L.

Common, Surat, and very common, Ahmedabad, on natural waste land in valleys and the edges of nullahs, often in association with *Andropogon Squarrosus*, L. Flowers from September onwards. (SD. or almost D.)

10. Erianthus, Michx.

1. *E. Ravennæ*, Beauv. (teste R. K. Bhide.)

Abundant at Ahmedabad on all waste sandy ground. This grass, which is usually erroneously called "Pampas grass" by European residents, is not only a conspicuous feature of the landscape round Ahmedabad, but has an important economic use, as its long stiff stems are tied together to form tatties for thatching and sold by the Waghris and Marwari gipsies of Ahmedabad. From the fact that its clumps are often found in conspicuous lines it may be inferred that it used to be planted. It is a great hiding place for hare, jackal, quail and other animals. In Gujerati it is called "Sarkhat." Cooke's description is defective in several particulars, the dimensions of length both of the stem and the leaves being understated, and the dimensions of the breadth of the leaves overstated. He describes the leaves as flat whereas they are, except at the tip, deeply grooved. This grass is essentially a sand-grass and is typical of North-West India. Ahmedabad is probably its furthest southern limit. Flowers, October onwards. (D.)

I venture to suggest that the genera *Saccharum* and *Erianthus* ought to be amalgamated. The differentiation of the occasional awn in *Erianthus* ought not to outweigh the remarkable similarity of habit between the two genera. *Saccharum spontaneum* is an exact miniature of *Erianthus Ravennæ*. The similarity of leaf-form, with the grooved and unequal-sided blade and conspicuous white midrib is very noticeable.

11. Pollinia, Trin.

1. *P. argentea*, Trin.

Not uncommon on roadsides at Surat. (Spor.)

12. Rottboellia, L. fil.

1. *R. compressa*, L. f.

On the banks of the Kankaria tank, Ahmedabad (Spor.)

2. *R. exaltata*, L. f. (teste R. K. Bhide.)

Fields of gourds, Ahmedabad. There is a taller and more glaucus *Rottboellia* which grows commonly on the roadsides at Surat. This I placed to *R. exaltata*, but Mr. Bhide's identification of the Ahmedabad specimens as belonging to that species make me doubt whether the Surat grass does not belong to a different species. Unfortunately I have no Surat specimens by me, and no access to that district at present. (Spor.)

13. Apluda, L.

1. *A. varia*, Hack.
Abundant both at Surat and Ahmedabad and one of the principle fodder-grasses of both districts. In Surat it is usually associated with *Themeda ciliata*, Hack., (q.v.). (D.)

14. Ischaemum.

1. *I. rugosum*, Salisb.
Not uncommon at Surat and Ahmedabad either as isolated plants or in small patches in fields. I observed some plants in my compound at Ahmedabad in which the lower involucral glume of the sessile spikelet was of a deep claret-red colour, instead of the ordinary creamy white. (SD.) But in wet places in valley bottoms in the Prantij Taluka dominant also.
2. *I. laxum*, Br. (teste R. K. Bhide).
In the Bhadar grass-plot where the famine grass was stored, and so probably an alien, Ahmedabad. The pedicillate spikelets of this grass had no awns as described by Cooke so far as the specimens examined at Ahmedabad go, and Mr. Bhide tells me that it is the same with the specimens in the Poona herbarium.

15. Arthraxon, Beauv.

1. *A. microphyllus*, Hochst.
Very common on the city walls, both at Surat and Ahmedabad, in association with *Aristida adscensionis*, L., and *Chloris tenella*, R., as well as the following flowering plants, *Linaria ramosissima*, Wall. and *Lindenbergia urticæfolia*, Link (both *Scrophularineæ*) (D.)

2. *A. ciliaris*, Beauv.
In the Bhadar famine-grass plot, Ahmedabad, and so probably an alien.

16. Thelepogon, Roth.

1. *T. elegans*, R.
A single plant in a compound in the Bhadar, Ahmedabad.

17. Andropogon, L.

* 1. *A.* (*Cymbopogon*) *Martini*, Roxb. (teste R. K. Bhide).
This is the largest but worst of the fodder grasses of the big "bids" in the Prantij Taluka. The whole plant has a highly resinous odour. (D.)
2. *A.* (*C.*) *pumilus*, Roxb.
Common on the high banks of creeks at Surat. Flowers late monsoon. (D).
3. *A.* (*Hypogynium*) *foveolatus*, Delile.
Common on sandy, alluvial soil, Surat, and occasional Ahmedabad. (SD.)
4. *A.* (*Amphilopis*) *pertusus*, Willd.
Common on pastures, Surat, and Ahmedabad (Spor.).
5. *A.* (*Sorghum*) *halepensis*, Brot.
Very common along the banks of the B. B. & C. I. Railway in the Surat district, and elsewhere Surat. In Ahmedabad only on the Bhadar famine-grass plot, and so probably an alien. But abundant in the north of the district. Reed pens are made from this grass (SD.)
6. *A.* (*S.*) *purpureo-sericeus*, Hochst.
At Ahmedabad only in the Bhadar famine-grass plot, and so probably an alien.
7. *A.* (*Dichanthium*) *caricosus*, L.
On the sides of roads and borders of fields, Surat, fairly frequent. (Spor.)

8. *A.* (*D.*) *annulatus*, Torsk.

Very common, Surat and Ahmedabad. The species of the subgenus *Dischanthium* and especially this species form the principal late fodder in compounds and middle class pastures. Grass is usually cut twice, once in August and once at the Divali. These *Andropogons* seem to mature *after* the first crop is removed. (D.)

9. *A.* (*Heteropogon*) *contortus*, L.

Surat and Ahmedabad, fairly frequent. This grass is usually called "spear-grass" in the Floras, but the common "spear-grass" of the Deccan is *Aristida adscenscionis* (q. v.). Flowers late monsoon. (D.)

10. *A. Squarrosus*, L. f.

This is the well-known "khas-khas" from the roots of which tatties are made. Cooke considers it as not a true native but I must differ from this view. The grass is found occasionally in Surat district (Jalalpur and Bardoli talukas) and commonly in the damper hollows near Ahmedabad and in the north of the district in circumstances which leave no doubt that it is a true wild denizen of Gujerath. Flowers late monsoon and after. (SD.)

18. Themeda, Torsk.

(= Anthistiria, L.)

1. *T. Ciliata*, Hack.

This is abundant in Surat, and forms the principal fodder grass of that district. It is common but less universal in Ahmedabad (D.)

19. Iseilema, Hack.

1. *I. laxum*, Hack.

Not uncommon on alluvial soil, Surat. Flowers late monsoon. (SD)

20. Polytoca, Br.

1. *P. barbata*, Stapf.

Occasional, Surat, usually in association with *Themeda ciliata*, Hack. (Spor.)

21. Aristida, L.

1. *A. Adscenscionis, L.*

Abundant on the city walls, Surat and Ahmedabad and on dry hills, Ahmedabad. This is the true "spear-grass" of the Bombay Deccan. (D.)

2. *A. redacta*, Stapf. (teste R. K. Bhide.)

Occasionally replaces the former on sandy waste at Ahmedabad. I suggested to Mr. Bhide, and he concurs that *A. redacta*, Stapf. and *A. funiculata*, Trin. ought to be amalgamated as one species. In that case *funiculata*, as the earlier name would have precedence. However without seeing Stapf.'s paper in the Kew Bulletin of 1892 and without more study of the forms we cannot definitely refuse to accept the differentiation, and as Mr. Bhide refers my specimens to *A. redacta* in preference to the other I have adopted that name. (D.)

22. Tragus, Haller.

1. *T. racemosus*, Scop.

Very common on shallow sandy waste, such as the barrener parts of hillsides and banks, Ahmedabad, always in association with *Gracilea, Royleana* (q. v.), *Indigofera cordifolia* (order *Leguminosæ*), and *Kyllinga triceps*, Rottb. (order *Cyperaceæ*), and usually with reduced forms of *Eleusine Ægyptiaca* Desf. (q. v.), *Chloris villosa* (q. v.) and the next species. The above are

typical only of shallow soil. In deeper sand other forms come in. Of the above *Indigofera cordifolia* is the dominant species. All the others are subdominant except *Chloris* which is sporadic. (SD.)

23. Perotis, Ait.

1. *P. latifolia*, Ait.
Very common on sandy wastes and in sandy lanes and fields, Ahmedabad (v. supra). Cooke's note:—" Flowers Oct.—Aug." must be a mistake for flowers Aug.—Oct. (Spor. or almost SD.)

24. Sporobulus, Br.

1. *S. diander*, Beauv.
Very common Surat, and Ahmedabad. Flowers early and mid-monsoon. (SD.)

* 25. Leptochloa.

* 1. *L. polystachya*, Benth. (teste R. K. Bhide).
On the banks of the Kankaria tank, Ahmedabad.

26. Eragrostis, Beauv.

1. *E. ciliaris*, var. *brachystachya*, Boiss.
Very common in all dry and barren places. Surat and Ahmedabad. Flowers late monsoon. (SD.)
2. *E. tenella*, var. *plumosa*, Stapf.
Very common in cultivated fields, Ahmedabad. Flowers mid and late monsoon. (SD.)
3. *E. interrupta*, var. *Koenigii*, Stapf.
Very common in cultivated field, Surat district (noted as far east as Bardoli); in Ahmedabad and north of the district only on black soil or in waterholes. (Spor.)
4. *E. amabilis*, Wight et Arn.
Common in compounds, Ahmedabad and one specimen on a roadside, Surat. Flowers late monsoon. (Spor.)
5. *E. Gangetica*, Steud.
On the margins of most tanks, Ahmedabad and north of the district. (D.)
6. *E. minor*, Host.
In compounds, Ahmedabad, often in association with *E. amabilis*. Flowers late monsoon. (Spor.)
7. *E. tremula*, Hochst.
A typical member of the sand flora, Ahmedabad. Common both on sandy waste and in sandy fields, but it will not grow in the shallow soil which supports the flora noted under *Tragus racemosus* (q. v.) only (Spor.) at Ahmedabad, but occasionally (SD.) and even (D.) in the north of the district.
8. *E. pilosa*, Beauv.
Very common in compounds, Surat and Ahmedabad. Flowers the whole monsoon. (SD.)

27. Gracilea, Koen.

1. *G. Royleana*, Hook. f.
Very common on the city wall, Surat, and on sandy hills, Ahmedabad. Only grows in very shallow earth. (v. sub *Tragus racemosus*) (SD.)

28. Cynodon, Pers.

1. *C. dactylon*, Pers.
The " harali " grass, (though this name is not used by the natives of

Gujerat). Common. The peculiar feature of this grass is its capacity for retaining its chloroplastids unaltered by drought. It remains green, and even goes on flowering almost throughout the year. (D.)

29. CHLORIS, Sw.

1. *C. tenella*, Roxb.

Occasional on the city wall, and on banks, Surat. Very common in almost all situations, Ahmedabad. The racemes are described by Cooke as usually erect, but they are in reality almost always decurved. (SD.)

2. *C. villosa*, Pers.

Very common on sandy hills and barren pasture, Ahmedabad. (Spor.)

3. *C. barbata*, Sw.

In rich land and on the edges of tanks, Ahmedabad. (Spor.)

* 4. *C. virgata*, Sw. (teste R. K. Bhide.)

Abundant on the most gravelly and barren land by roads and in compounds, Surat and Ahmedabad. (D.)

30. ELEUSINE, Gaertn.

1. *E. Indica*, Gaertn.

Common in compounds and where water runs or accumulates, Surat and Ahmedabad. (SD.)

2. *E. Aegyptiaca*, Desf.

Abundant in all situations, Surat and Ahmedabad. Often reduced in shallow gravelly soil to two or even one spikelet. (D.)

3. *E. aristata*, Ehrenb.

Common on sandy soil, Ahmedabad, often associated with *Erianthus Ravennæ*; also on the Tapti banks, Surat. This grass is very slender and can only grow where there is freedom from all tall vegetation. (Spor.)

31. DINEBRA, Jacq.

1. *D. Arabica*, Jacq.

Abundant in Surat and common in Ahmedabad as a weed of cultivation often in association with *Eragrostis interrupta*, var. *koenigii* (q. v.) Noted as far from Surat as Bardoli and Jalalpur.

32. ORYZA, L.

There is a rice which grows in water holes in low valleys under the Chandola canal, Ahmedabad. This may be *O. coarctata*, Roxb. or an escape from cultivation.

33. ELYTROPHORUS, Beauv.

1. *E. articulatus*, Beauv.

In dry rice fields in the Modasa Petha in the extreme North-East of the Ahmedabad district. (Spor.)

34. AELUROPUS, Trin.

1. *A. villosus*, Trin.

Common on the sandy foreshores of creeks, Surat. (D. but often in "glorious isolation" as the only plant over large areas).

DESCRIPTIONS OF INDIAN MICRO-LEPIDOPTERA.

BY

E. MEYRICK, B.A., F.R.S., F.Z.S.

XVIII.

(*Continued from page 781 of Volume XXII.*)

STENOMIDÆ.

Stenoma ichnæa, n. sp.

♂ ♀. 22-25 mm. Head and thorax whitish-fuscous or pale fuscous, thorax sometimes darker anteriorly. Palpi brownish-whitish. Antennal ciliations in ♂ 3. Abdomen light ochreous-grey. Forewings elongate, moderate, costa gently arched, apex rounded-obtuse, termen rounded, little oblique: whitish-fuscous, on dorsal $\frac{2}{3}$ more or less suffused with light fuscous and sprinkled irregularly with dark fuscous; a more or less developed fine dark fuscous streak along fold towards base: oblique dark fuscous spots on costa at $\frac{1}{4}$, middle, and $\frac{3}{4}$; stigmata small, dark fuscous, plical obliquely beyond first discal; a series of dark fuscous dots round apex and termen: cilia whitish-fuscous, with faint fuscous median line. Hindwings pale fuscous; cilia whitish-fuscous, with faint darker subbasal shade.

Anshi, Kanara, bred in January (Maxwell); six specimens. Larva green, head brown, collar black, with lateral (spiracular) series of black spots, also with black supraspiracular spots on 3, 4, and several of the posterior segments; feeding between spun leaves, or a broken portion spun on surface of a whole leaf, on *Symplocos spicata*: pupa very obese, making a constant clicking sound when disturbed (Maxwell).

GRACILARIADÆ.

Lithocolletis triplex, n. sp.

♀. 10 mm. Head ochreous-whitish. Palpi whitish, ringed with dark fuscous. Thorax reddish-ochreous, partly tinged with whitish. Abdomen grey. Forewings lanceolate; bronzy-ochreous, tinged with reddish; three slightly inwards-oblique narrow white transverse fasciæ, at $\frac{1}{4}$, middle, and $\frac{3}{4}$, first two almost straight, third hardly angulated above middle, each nearly preceded by a considerable spot of blackish irroration on costa, and the second on dorsum also: undefined patches of blackish irroration on costa and termen near beyond third fascia, and a smaller one at apex: cilia pale greyish, on termen with basal half bronzy-ochreous, with a patch of blackish irroration above tornus. Hindwings dark grey; cilia pale grey.

Pykara, 7000 ft., Nilgiris, in April (Andrewes). Allied to *conformis*: a large and distinct species.

Lithocolletis virgulata, n. sp.

♂. 6 mm. Head and palpi whitish. Forewings narrow-lanceolate; ochreous-chestnut-brown; an irregular whitish median basal streak to $\frac{1}{4}$, irregularly irrorated with black, and connected with dorsum near base by a mark of black irroration; three somewhat inwardly oblique whitish transverse fasciæ, angulated above middle, lower portion sometimes mostly suffused with groundcolour, their margins marked with black irroration, posterior margins strongest but interrupted above angle, posterior margin of third running into apex: cilia whitish-ochreous, round apex irrorated with black points. Hindwings grey: cilia pale greyish-ochreous.

Manchikeri, Kanara, bred in May, from cocoons found on a *Ficus* (Maxwell); two specimens. It is exceptional for a *Lithocolletis* larva to

pupate outside the mine. Mr. Maxwell writes "The noticeable thing was the extremely large size of the cocoon itself in proportion to the insect; the tree is a common one, but I have never noticed the cocoons elsewhere." The species is allied to *conformis*, but very distinct.

Acrocercops civica, n. sp.

♂ ♀. 6 mm. Head whitish mixed with fuscous. Palpi with appressed scales, white, with two bands on second joint and three on terminal dark fuscous. Thorax brownish irrorated with dark fuscous. Abdomen grey, beneath white, sides irregularly barred with dark fuscous. Forewings extremely narrow, elongate-lanceolate; brownish, irrorated with dark fuscous, costa suffused with dark fuscous, dorsum sometimes more or less strigulated with white; four transverse fasciæ composed each of a pair of white striæ more or less connected in disc but separated with dark fuscous at extremities, more widely on dorsum, first at $\frac{1}{3}$, second beyond middle, third at $\frac{2}{3}$, fourth at $\frac{5}{6}$, less well marked; a slender white transverse bar before apex, enlarged on costa and sometimes containing a dark fuscous speck: cilia pale grey, round apex with two dark grey lines. Hindwings grey; cilia light grey.

Karwar, Kanara, bred in July (Maxwell); ten specimens. Larva bright red, mining blotches in leaves of Cinnamon (*Cinnamomum zeylanicum*), many larvæ in each leaf; pupa orange, in external detached oval orange cocoon (Maxwell). Allied to *ordinatella*.

Acrocercops pentalocha, Meyr.

Larva mining blotches in leaves of Mango (*Mangifera indica*); pupa in external white flat oval cocoon (Maxwell).

Acrocercops cathedræa, Meyr.

Larva mining inconspicuous galleries in leaves of "Kungina" creeper.

Acrocercops cylicota, n. sp.

♂. 7 mm. Head shining white, face grey. Palpi slender, whitish, second joint suffused with dark grey towards apex, terminal joint with two rings and apex dark fuscous. Thorax shining white, with lateral ochreous-bronze stripes. Abdomen dark grey, beneath white, segmental edges dark fuscous. Forewings very narrow, elongate-lanceolate; ochreous-bronze; three shining white dorsal blotches edged with black, first antemedian, triangular, reaching costa, on dorsum rather broadly extended to base, second postmedian, rounded-triangular, not quite reaching costa, third narrow-oblong, extending along termen to near apex; a white apical dot: cilia grey, with a white patch on terminal blotch. Hindwings rather dark grey; cilia grey.

Karwar, Kanara, bred in June (Maxwell); one specimen. Larva mining blotches in leaves of *Colebrookea oppositifolia* (*Labiatæ*); pupa in cocoon in folded edge of leaf (Maxwell).

Acrocercops isodelta, Meyr.

One specimen sent by Mr. Maxwell as bred from the same plant with *A. cylicota*, and not recognised as distinct; the two species are generally similar but certainly distinct, and as only one of each was sent, the identification of the larva lacks precision, and needs further investigation.

Acrocercops hexachorda, n. sp.

♂. 8 mm. Head and thorax whitish. Palpi slender, whitish, with subapical ring of second joint, two rings of terminal, and apical edge anteriorly dark fuscous. Forewings very narrowly elongate-lanceolate; light brownish-ochreous; six slender oblique equidistant whitish fasciæ, edged with a few blackish specks, first at $\frac{1}{4}$, sixth towards apex; some blackish scales transversely arranged midway between first and base, and some scattered along dorsum: cilia ochreous-whitish, with an oblique black line crossing apex at base. Hindwings grey; cilia light violet-grey.

N. Coorg, at 3,500 feet, in January (Newcome); two specimens. Allied to group of *ordinatella*.

Acrocercops scandalota, n. sp.

♂. 7 mm. Head grey-whitish, collar ochreous-whitish. Palpi slender white, lined above with dark fuscous. Thorax ochreous-whitish, patagia dark fuscous. Forewings extremely narrowly elongate-lanceolate; dark bronzy-fuscous; a narrow ochreous-whitish streak along dorsum from base to tornus; close beyond this a triangular ochreous-whitish spot hardly reaching costa, followed by an oblique silvery-whitish costal strigula surrounded with blackish-fuscous; a small ochreous-whitish triangular spot on termen before apex; a silvery-whitish oblique strigula surrounded with blackish-fuscous crosssing apex, partly in costal cilia: cilia grey, round apex whitish, with a short dark fuscous subbasal mark opposite apex, and two bars beneath apex. Hindwings and cilia rather dark grey, with violet reflections.

N. Coorg, at 3,500 feet, in January (Newcome); one specimen. Allied to the Australian *didymella*.

Acrocercops gemoniella, Staint.

Having now obtained genuine examples of this species, I find that the insect previously recorded by me under this name is really a distinct species, which is described below; I had remarked a difference, but supposed it to be varietal (Vol. XVIII, p. 820). Larva mining blotches in leaves of Sugarcane (*Saccharum officinarum*); pupa in external oval brownish-yellow cocoon in depression on surface of leaf (Maxwell). Stainton's original type was bred, but from an unknown plant.

Acrocercops præclusa, n. sp.

♂ ♀. 7-8 mm. Head silvery-white. Palpi slender, white. Thorax white, patagia ochreous-bronzy. Abdomen grey, beneath whitish. Forewings very narrowly elongate, parallel-sided, moderately pointed; bronzy-ochreous; a narrow white dorsal stripe from base to tornus, posterior third expanded into a semioval dilation reaching half across wing, edge otherwise straight; a somewhat oblique free white strigula from costa directed towards extremity of this; a broad white præapical fascia narrowed towards costa, adjoining a black apical dot: cilia pale grey, round apex white, at apex with a short black subbasal hook. Hindwings grey; cilia pale ochreous-grey.

Maskeliya, Ceylon, in March and April (Pole); N. Coorg, at 3,500 feet, in October (Newcome); six specimens. Formerly recorded as *gemoniella*, from which it differs by absence of median prominence of dorsal streak and dorsal dot of groundcolour beneath it, also by præapical fascia fully reaching costa in moderate breadth, whereas in *gemoniella* it is rounded off above so as hardly to reach it.

Acrocercops syngramma, n. sp.

♂. 7 mm. Head white, face pale grey. Palpi slender, white. Thorax white, patagia bronzy. Abdomen grey, apex dark fuscous, ventral surface white, segmental margins dark fuscous. Forewings extremely narrowly elongate-lanceolate; bronzy-fuscous; a moderate white streak along dorsum from base to tornus, its posterior fourth forming a semioval dilation reaching $\frac{2}{3}$ across wing, edge otherwise straight; a somewhat oblique white strigual from $\frac{3}{4}$ of costa, running into a subtriangular white præapical fascia whose apex narrowly reaches costa, limiting a black apical dot: cilia grey, round apex white, with a grey bar below apex, and a black subbasal hook at apex. Hindwings rather dark grey; cilia grey.

Karwar, Kanara, bred in July (Maxwell): two specimens. Larva mining a compact blotch in leaves of Mango (*Mangifera indica*); pupa in a detached oval brownish-yellow cocoon on surface of leaf (Maxwell). The species is very similar to *præclusa*, but differs by the costal strigula running into præapical fascia, and conspicuous dark apex of abdomen.

Acrocercops vanula, Meyr.

Larva mining large blotches in leaves of *Terminalia tomentosa* (*Combretaceæ*); pupa yellowish, in large oval cream-coloured cocoon spun usually on vein inside the mine, the cuticle subsequently peeling off and leaving the cocoon exposed; this seems the normal arrangement, but in captivity the larva sometimes makes an external cocoon in a recess on surface of leaf (Maxwell). Mr. Maxwell writes "The imago is peculiar in that whenever observed, even while at rest, it has been found to stand high on its legs quivering continuously; I have bred it frequently at different times for two years, and this characteristic is always present, though not noticed in any other *Acrocercops*."

Acrocercops elaphopa, n. sp.

♂. 7 mm. Head and thorax light grey. Palpi slender, whitish. Abdomen grey, segmental margins white beneath, apex dark fuscous. Forewings very narrowly elongate-lanceolate; glossy grey, darker towards apex; costal and dorsal transverse whitish strigulæ at $\frac{4}{5}$, almost meeting; a round black apical spot, finely edged with whitish: cilia light grey, round apex with a subbasal dark fuscous line preceded and followed by whitish. Hindwings rather dark grey; cilia light grey, with faint purple tinge.

Karwar, Kanara, bred in July (Maxwell); one specimen. Bred from an external oval cocoon on depressed vein on surface of leaf of "Total" creeper; identification of plant promised later (Maxwell). Allied to *sauropis*.

Acrocercops citrodora, n. sp.

♂. 8 mm. Head and thorax whitish-yellow, patagia rather dark fuscous. Palpi slender, whitish, apex of second joint and a submedian ring of terminal joint fuscous. Forewings very narrow, elongate-lanceolate; dark fuscous; a whitish-yellow streak along dorsum from base to $\frac{2}{5}$ of wing, its upper edge forming two oblique wedge-shaped projections; a yellow-whitish dot in disc just beyond this; a flattened-triangular whitish-yellow spot extending along dorsum from middle of wing to tornus, emitting posteriorly a fine oblique strigula towards apex of wing; apex of wing chestnut-brown, preceded by a spot of blackish suffusion which is edged anteriorly by silvery-white costal and terminal dots: cilia rather dark grey, round apex with base purple-white edged by a dark purple-fuscous line. Hindwings dark grey; cilia rather dark grey.

N. Coorg, at 3,500 feet, in January (Newcome); one specimen. Perhaps allied to *telearcha*, but very distinct.

Acrocercops barringtoniella, Dev.

Bred by Mr. Maxwell from larvæ mining blotches in leaves of *Careya arborea* (*Lecythidaceæ*); has been reared previously from *Barringtonia*, which belongs to the same natural order.

Acrocercops austeropa, n. sp.

♂. 9 mm. Head ochreous-grey-whitish. Palpi with second joint broadly tufted with long ochreous-grey-whitish hairs, blotched with blackish, terminal joint whitish with two blackish rings. Thorax greyish spotted with dark fuscous. Abdomen grey, beneath whitish, with lateral series of oblique black bars. Forewings very narrow, elongate-lanceolate; dark fuscous, irrorated with whitish points; a suffused blackish dot towards dorsum at $\frac{1}{3}$, followed by an oblique mark of whitish suffusion; an undefined oblique blackish streak from middle of costa, reaching $\frac{3}{5}$ across wing, lower portion edged with whitish anteriorly; two shorter oblique blackish streaks from costa posteriorly, and one inwardly oblique before apex; a dot of dark suffusion on tornus, edged above with whitish; an indistinct fine blue-leaden line crossing wing towards apex: cilia grey, round apex with black subbasal line and some series of blackish points. Hindwings dark grey; cilia grey.

Supa, Kanara, bred in May (Maxwell); one specimen. Larva feeding on "Akri" (Maxwell); the cocoon (forwarded) is very flat, oval, attached to surface of leaf, whitish-ochreous, with four scattered bubbles on its surface, apparently similar to those on the cocoon of *Epicephala chalybeana*. Allied to *patricia*; tuft of palpi unusually long.

Acrocercops scenus, n. sp.

♀. 7 mm. Head white, crown mixed with dark fuscous. (Labial palpi broken.) Thorax white mixed with dark fuscous. Abdomen fuscous, beneath white, with lateral series of oblique black bars. Forewings extremely narrowly elongate-lanceolate; brown irregularly mixed with black; four triangular white dorsal blotches reaching costa except fourth, their dorsal edge mixed with brown and strigulated with black, first two confluent dorsally and extending from base to ⅓ of wing, third beyond middle, just touching second and fourth, fourth tornal; costa from second to apex dotted with white; a blackish dash above posterior edge of fourth; a small white spot on termen towards apex; cilia grey, round apex white with dark fuscous line. Hindwings rather dark grey; cilia grey.

Karwar, Kanara, bred in June (Maxwell); one specimen. Larva bright green, mining galleries in leaves of "Changana" bush, many larvæ in each leaf; pupa long, green, in oval white transparent cocoon on depressed vein of leaf (Maxwell). Allied to *telestis*.

Stomphastis plectica, Meyr.

Larva mining blotches in leaves of *Sebastiana chamælea* (*Euphorbiaceæ*); pupa in detached oval white cocoon in depression on top of leaf, preferring the extreme tip (Maxwell). This insect occurs also in South Africa.

Cyphosticha pterocala, n. sp.

♂ ♀. 9 mm. Head whitish, face ochreous-tinged, sides of forehead marked with dark fuscous. Palpi slender, whitish, second and terminal joints each with two bands of dark fuscous irroration. Thorax white, patagia ochreous-grey sprinkled with dark fuscous. Abdomen dark grey. Middle tibiæ and tarsi thickened with dense scales, dark fuscous, with whitish band before apex of tarsi; posterior tibiæ dark fuscous, apex white, tarsi white, three basal joints with blackish apical bands and projections of rough scales above. Forewings very narrowly elongate-lanceolate, purple-greyish-ochreous irrorated with dark fuscous; an irregular-edged attenuated white streak running along dorsum from base to about tornus, marked with some minute scattered brownish strigulæ; cilia grey, round apex whitish-grey with violet reflections and three dark grey lines. Hindwings dark grey; cilia grey.

N. Canara, at 3,700 feet, in January (Newcome); two specimens. A peculiar species, possibly worthy of generic separation on the tarsal characters.

Gracilaria ariana, n. sp.

♀. 13 mm. Head crimson-grey, face white. Palpi slender, crimson, towards apex dark fuscous. Thorax yellow, suffused with light greyish-crimson anteriorly. Abdomen grey, apex whitish. Middle tibiæ crimson, externally suffused with dark grey, tarsi white. Forewings very narrowly elongate-lanceolate; bright clear yellow, costal edge ferruginous-tinged towards base; a narrow purple-coppery streak along dorsum from base throughout, extending at apex to costa, about ⅓ of breadth of wing, marked along dorsum with a series of deep indigo-blue strigulæ; cilia light ochreous-grey, becoming violet-coppery round apex. Hindwings and cilia grey.

Peradeniya, Ceylon, in September (Green); one specimen. Allied to *ocellatella*.

Hyponomeutidæ.

Lyonetiantis, n. g.

Head [illegible] with rough spreading hairs, face with appressed scales, ocelli present, tongue developed. Antennæ ♂, in ♂ simple, basal joint

moderate without pecten. Labial palpi moderately long, slightly curved, extraversing, second joint with appressed scales, terminal joint as long as second, loosely scaled anteriorly, laterally pointed. Maxillary palpi *minute*. Proboscis *scales smooth-scaled*. Forewings with 11 veins, 2 from before ¾ of cell, 3 from angle, 5-8 approximated, 7 and 8 stalked, 7 to termen, 11 from middle, accessories developed. Hindwings almost ½ forewings, with 7 veins; 2 remote, 3 absent, 5 and 6 approximated.

Allied to Argyresthia.

Lypogramma chalcidonella, n. sp.

♂ ♀. 8-10 mm. Head and thorax white, face light fuscous. Palpi whitish. Abdomen grey. Forewings elongate-lanceolate, narrow, acute, glossy purplish-fuscous, variably more or less suffused with shining brassy-yellowish; costa finely dotted with white on posterior half, a broad ante-white dorsal streak, at base nearly reaching costa, gradually narrowed to a point at termen, upper edge with a series of whitish projections, towards dorsum often with some fuscous specks or shades; a fine blackish terminal line marked with minute white dots; cilia light greyish-ochreous or more brassy-tinged. Hindwings grey, cilia light greyish-ochreous.

Kharda, from September to November, twelve specimens.

Argyresthia semifusca, n. sp.

♂. 9-11 mm. Head white. Palpi white, with dark fuscous lateral line. Thorax white, with dark fuscous lateral stripe. Abdomen grey, segmental margins white. Forewings lanceolate, pointed; 7 and 8 separate; deep fuscous-purple; some white specks on costa; a strong yellowish-white dorsal streak from base to near middle, posteriorly narrowed, followed by an oblique blackish spot, whence a slender posteriorly oblique blackish fascia runs to costa; blackish spots in disc at ¼ and at middle of costa; a slight whitish costal streak above tornus, preceded by a blackish spot; an oblique white mark on costa towards apex, preceded by blackish suffusion; some white terminal specks; cilia grey, round apex dark fuscous. Hindwings and cilia grey.

Khasi, in October, two specimens.

Argyresthia leucocrana, n. sp.

♂ ♀. 9-10 mm. Head and palpi white. Thorax white, shoulders pale fuscous. Abdomen grey-whitish. Forewings lanceolate, pointed; 7 and 8 separate; light fuscous or whitish-fuscous, irrorated with dark fuscous; dorsal area beneath fold whitish, with some scattered dark fuscous scales; small dark fuscous spots in disc at ¼ and ½, and a dorsal spot between them; a white dash above tornus, followed somewhat by an oblique dark fuscous mark; a costal blackish spot-like dot, partially edged with white; cilia grey-whitish, round apex with short dark fuscous lines. Hindwings grey, thinly scaled towards base; cilia pale grey.

Mankhiya, Garo Hills, about 4000 feet, in June (Pole, de Worms); six specimens.

Argyresthia flabellifera, n. sp.

♂ ♀. 8-9 mm. Head and palpi white. Thorax white, with a broad light fuscous lateral stripe. Abdomen grey-whitish. Forewings lanceolate, pointed; 7 and 8 separate; white with violet or brassy reflections, closely irrorated with dark fuscous except towards dorsum, with several fuscous strigulæ on dorsum before middle; a small dark fuscous spot on fold at ¼ of wing, and one towards costa before middle; a slender oblique dark fuscous posteriorly flabellate dorsal streak from middle, sometimes narrowly interrupted beneath costa; an oblique dark fuscous strigula above tornus; cilia light greyish, round apex with two dark fuscous lines. Hindwings and cilia grey.

Khasi, in April, September, and November; twelve specimens.

Zelleria strophæa, n. sp.

♂ ♀. 12-17 mm. Head and thorax white, more or less sprinkled with dark fuscous. Palpi white suffusedly irrorated with dark fuscous. Abdomen in ♂ whitish sprinkled with fuscous, in ♀ grey. Forewings elongate-lanceolate; white, more or less largely suffused with fuscous and irrorated with darker fuscous, the white ground colour appearing as some irregular markings in disc and towards apex, with scattered small black dots tending to be arranged in longitudinal series; stigmata forming small blackish spots, plical very obliquely before first discal, an additional similar spot obliquely beyond second discal towards tornus; cilia grey-whitish, round apex fuscous with a black subbasal line. Hindwings grey, in cell and towards base beneath it thinly scaled and semihyaline, upper and lower margins of cell dark fuscous; cilia light fuscous.

Maskeliya, Namunukuli (6,000 feet), Puttalam, Ceylon, from September to February, and in June (Pole, Green); eleven specimens.

Paradoxus, Staint.

Stainton has misapprehended the structure of the palpi of this genus, and I am not aware that his error has been corrected: the joints of the labial palpi which he describes as basal and second are really the second and third, and their structure is as in *Xyrosaris*, from which this genus differs by having the antennæ shorter than the forewings.

Paradoxus deformis, n. sp.

♀. 13 mm. Head white, sprinkled with grey specks. Palpi moderate (shorter than in *osyridella*), white irrorated with dark grey specks except towards apex. Thorax whitish mixed with grey. Abdomen grey, anal segment whitish edged laterally with blackish. Forewings elongate, narrow, costa gently arched, bent somewhat before middle, apex obtuse-pointed, termen extremely oblique, hardly sinuate; pale greyish, finely darker-sprinkled, base somewhat darker-suffused; about forty small black somewhat raised dots scattered over wing; a moderately large semicircular suffused blackish spot on dorsum before middle of wing: cilia commencing abruptly near before apex of wing, grey, round apex suffused with dark grey, with an interrupted black basal line. Hindwings rather dark grey, without hyaline patch; cilia grey.

Kegalle, Ceylon (Alston); one specimen.

Xyrosaris campsiptila, n. sp.

♂ ♀. 12 mm. Head and thorax pale brownish, mixed with whitish and finely sprinkled with dark fuscous. Palpi whitish-brownish, irrorated with dark fuscous. Abdomen in ♂ ochreous-grey-whitish, in ♀ grey, segmental margins whitish. Forewings elongate, narrow, widest at $\frac{1}{3}$, costa gently arched, apex pointed, termen sinuate, extremely oblique; pale brownish, finely sprinkled with dark fuscous specks, and strewn with short straight transverse whitish strigæ, and with scattered minute black raised dots and strigulæ; obscure patches of fuscous suffusion on middle of costa, and on dorsum at $\frac{1}{3}$ and $\frac{2}{3}$; an angulated transverse series of several small blackish tufts before apex: cilia pale brownish, on termen with rows of black points and an interrupted dark fuscous subbasal shade. Hindwings grey; cell, and an elongate patch beneath it towards base, hyaline but thinly strewn with grey hairs; cilia light ochreous-grey.

Puttalam, Ceylon, in November (Pole); N. Coorg, 3,500 feet, in May (Newcome): three specimens.

Prays erebitis, n. sp.

♂. 12-13 mm. Head and thorax fuscous, face sometimes whitish. Palpi fuscous, extreme base and apex of terminal joint whitish. Abdomen dark grey. Forewings elongate, narrow, costa slightly arched, apex pointed, termen extremely obliquely rounded: fuscous, strigulated throughout

with dark fuscous, obscurely dotted with whitish between the strigulæ in disc and towards termen; a very undefined oblique darker fuscous fascia from middle of dorsum to middle of costa, extended along costa as an undefined patch to $\frac{3}{4}$: cilia fuscous, indistinctly mixed with whitish on two terminal bars. Hindwings pointed; rather dark fuscous, thinly scaled and iridescent on basal half; cilia fuscous.

Ootacamund, in December (Fletcher); two specimens.

Prays citri, Mill.

Madulsima, Maskeliya, Colombo, Ceylon (Pole, Mackwood, Green); N. Coorg, 3,500 feet (Newcome); from January to May. An injurious pest of the orange and other species of *Citrus*, the larva feeding in the shoots; it has been recorded from Southern Europe and Australia (*nephelomima*, Meyr., is a synonym), and Mr. S. Busck has sent me for identification a specimen from the Philippines; it is doubtless artificially spread with its foodplant.

Prays ducalis, n. sp.

♀. 16 mm. Head and thorax grey slightly mixed with whitish. Palpi and abdomen grey. Forewings elongate, narrow, costa gently arched, apex obtuse-pointed, termen slightly rounded, rather strongly oblique; white, strewn throughout with small dark fuscous spots and strigulæ, these dark markings are suffused together with fuscous to form irregular elongate patches extending along costa from base to $\frac{3}{4}$ and along dorsum from base to tornus, confluent near base and connected by a narrow oblique dark fuscous bar near middle of wing, beyond which the costal patch is expanded with dark fuscous suffusion reaching half across wing, and marked above this with obscure whitish suffusion on costa; cilia brownish with obscure whitish bars below apex and above tornus, at apex dark fuscous on basal half, on costa alternately light brownish and whitish. Hindwings tolerably pointed, not acute; grey, rather lighter and iridescent towards base; cilia grey.

Namunukuli, Ceylon, over 6,000 feet, in February (Green); one specimen.

Prays curulis, n. sp.

♀. 13 mm. Head grey, lower part of face white. Palpi grey, apex of joints whitish. Thorax grey, posterior extremity and apex of patagia white. Forewings elongate, narrow (rather less narrow than in *ducalis*), costa slightly arched, apex tolerably pointed, termen very obliquely rounded; white irregularly spotted with grey; irregular elongate patches of grey suffusion transversely marked with dark fuscous extending along costa from base to $\frac{3}{4}$ and along dorsum from base to tornus, connected by an oblique rather broad median fascia, mixed with blackish; apical area marked with several small dark fuscous spots: cilia grey suffused with coppery, towards base mixed with white and blackish, on costa white with a grey spot. Hindwings pointed; grey, rather thinly scaled and iridescent on basal half; cilia grey.

Khasis, in September; one specimen.

Prays acmonias, n. sp.

♀. 12-13 mm. Head bronzy-grey mixed with whitish. Palpi grey. Thorax dark ashy-grey, posteriorly whitish. Abdomen grey. Forewings elongate, rather narrow, costa anteriorly straight, posteriorly gently arched, apex tolerably pointed, termen slightly rounded, rather strongly oblique; white; some grey markings towards base of costa, and a patch of more or less developed grey marbling and suffusion extending along costa from $\frac{1}{3}$ to $\frac{3}{4}$; some small grey spots or suffusion on dorsum before middle; a transverse dark grey blackish-mixed blotch on dorsum beyond middle, confluent above with costal patch; a triangular dark grey tornal spot mixed with blackish; a small suffused blackish apical spot; three small blackish spots suffused together with dark grey occupying median portion of termen: cilia dark bronzy-grey, on basal half mixed with white. Hindwings tolerably pointed,

not acute; rather dark fuscous, thinly scaled and semihyaline on anterior half; cilia grey.

Rawalpindi (Manders); two specimens.

Diaphragmistis, n. g.

Head with appressed scales, sidetufts expanded anteriorly over base of antennæ; ocelli present; tongue short. Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderate, rather dilated, with strong pecten. Labial palpi moderate, slightly curved, subascending, with appressed scales, terminal joint somewhat longer than second, pointed. Maxillary palpi minute, drooping. Posterior tibiæ with appressed scales. Forewings with cell long, 2 from angle, 3 absent, 4 absent, 7 to termen, 8-10 rather near together, 11 from $\frac{1}{4}$. Hindwings almost 1, ovate-lanceolate, cilia 1; cell short and distorted, less than half wing, 2 from towards angle, curved near base, 3 from angle, 4 absent, 5 and 6 stalked, rising from near angle, 7 from angle, curved.

A development of *Hyponomeuta*.

Diaphragmistis macroglena, n. sp.

♂. 15 mm. Head white, crown with two small fuscous spots between antennæ. Palpi whitish. Thorax ochreous-whitish, with some groups of fuscous specks. Abdomen light grey, apex whitish. Forewings elongate, narrow, costa moderately arched, apex obtuse-pointed, termen extremely obliquely rounded; whitish, irregularly strigulated throughout with brownish, more closely and suffusedly towards costa posteriorly, with scattered blackish-fuscous scales and minute dots: cilia whitish, round apex with rows of blackish points and two black lines. Hindwings light grey: an elongate hyaline patch beneath cell, reaching from base to $\frac{1}{3}$ of wing, including posteriorly a black thickened glandular elongate mark; cilia light grey.

Khasis, in November; one specimen. The black mark of hindwings may probably be sexual.

Orthosaris, n. g.

Head shortly rough-scaled; tongue short. Antennæ $\frac{4}{5}$, in ♂ simple, basal joint moderate, with pecten. Labial palpi moderate, straight, subascending, second joint with appressed scales, terminal joint longer than second, thickened with scales becoming loosely expanded into an apical brush. Maxillary palpi rudimentary. Posterior tibiæ with appressed scales. Forewings with cell long, 2 from very near angle, 3 from angle, 4 absent, 5 approximated, 7 to termen, 8-10 near together, 11 from $\frac{1}{3}$. Hindwings 1, trapezoidal-ovate, cilia $\frac{3}{4}$; 2 moderately remote, parallel, 3 from angle, 4 absent, 5-7 slightly approximated towards base.

Also a development of *Hyponomeuta*.

Orthosaris strictulata, n. sp.

♂. 12 mm. Head white, face finely irrorated with fuscous. Palpi whitish finely irrorated with fuscous. Thorax whitish irrorated with dark fuscous. (Abdomen broken.) Forewings elongate, posteriorly slightly dilated, costa gently arched, more strongly posteriorly, apex tolerably pointed, termen slightly sinuate, somewhat oblique; whitish-fuscous, finely sprinkled with dark fuscous, and strewn throughout with short straight transverse whitish strigæ; an irregular series of several black dots near before apex and termen: cilia whitish-fuscous, base white, limited by a row of black points. Hindwings rather dark grey, lighter anteriorly; a hyaline elongate patch beneath cell from base to $\frac{2}{3}$ of wing; cilia whitish-grey.

Matale Ceylon, in August (Pole); one specimen.

Hyponomeuta prætincta, n. sp.

♂ ♀. 14-16 mm. Head white, crown with two blackish dots. Palpi

white, laterally mixed with dark grey except towards apex of joints. Thorax white, with a transverse median series of four small black spots. Abdomen grey. Forewings elongate, very narrow, costa slightly arched, apex obtuse-pointed, termen extremely obliquely rounded; whitish, more or less strigulated with grey and suffused with light grey, especially in disc posteriorly; an almost costal row of about seven black dots from base to near middle, a subcostal row of about eight from before middle to apex, a row of about ten above fold throughout, and a subdorsal row of about nine from base to $\frac{2}{3}$; a spot of dark purple-fuscous suffusion in disc near base, and a larger irregular patch in disc at $\frac{2}{3}$; apex of wing tinged with purplish: cilia grey, with a white spot on costa towards apex and a whitish tornal patch, between these tinged with purplish, with three blackish lines. Hindwings grey, thinly scaled and semihyaline near base; cilia grey.

Khasis, in October and November; four specimens.

Hyponomeuta calculosa, n. sp.

♂ ♀. 14-17 mm. Head whitish-ochreous, face sometimes tinged with grey. Palpi whitish-ochreous, laterally suffused with grey. Thorax light ochreous-grey. Abdomen whitish-ochreous tinged with grey. Forewings elongate, narrow, costa gently arched, apex obtuse, termen straight, rather oblique; rather glossy greyish-ochreous, with a few small scattered very obscure dark grey dots on veins, sometimes almost obsolete: a large blackish dot towards dorsum before middle: cilia light greyish-ochreous, with a spot of dark grey suffusion above apex, and a dark fuscous patch formed by confluence of a median shade on upper third of termen with an apical shade on median third. Hindwings light grey, thinly scaled and semihyaline near base; cilia pale greyish-ochreous.

Khasis, in October and November; fourteen specimens.

Hyponomeuta corusca, n. sp.

♀. 18 mm. Head ochreous-whitish, face greyish, crown with two blackish dots. Palpi loosely scaled towards apex, ochreous-whitish suffused with fuscous anteriorly and on second joint laterally. Thorax whitish-ochreous suffused with fuscous on posterior half of dorsum and towards anterior margin. Abdomen grey. Forewings elongate, costa slightly arched, apex tolerably pointed, termen nearly straight, rather oblique: glossy light bronzy-ochreous, on costal and submedian areas with longitudinal lines of irregular dark fuscous dots and small spots separated by white interspaces; disc occupied by an irregularly sinuate streak of bronzy-fuscous suffusion from base to middle: cilia pale bronzy-ochreous. Hindwings grey, rather thinly scaled near base; cilia whitish-ochreous, towards base suffused with light grey.

Khasis, in August; one specimen.

Nosymna lapillata, n. sp.

♀. 50 mm. Head ochreous-whitish. Antennæ simple, shortly ciliated. Palpi shorter and stouter than in *punctata*, blackish-grey, second joint ochreous-whitish on lower longitudinal half. Thorax ochreous-whitish, with small dark bluish-grey spots on shoulders and on each side posteriorly. Abdomen grey-whitish. Forewings elongate, costa gently arched, apex rounded-obtuse, termen rounded, rather oblique; ochreous-white, with irregularly scattered indigo-blackish-grey dots, several of these coalescing irregularly in disc; costa indigo-blackish-grey towards base: cilia ochreous-white. Hindwings and cilia ochreous-grey-whitish.

Darjiling, in March; one specimen. A second from Sikkim is probably the same species, but has palpi whitish-ochreous, thorax apparently without dark dots. From the above species *punctata* differs by pectinated antennæ *repletella* by barred cilia of forewings, *stipella* by dark grey hindwings.

Anticrates decaplaca, n. sp.

♀. 16 mm. Head yellow, neck and sides of face crimson-red. Palpi crimson, terminal joint yellow towards apex. Thorax yellow, apex of patagia and a postmedian bar crimson-red. Abdomen dull light crimson. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; crimson-red, with a yellow dot beneath costa near base, a small costal spot at $\frac{1}{3}$, and ten large yellow spots, *viz.*, one in disc near base, two on costa before and beyond middle, two on dorsum before middle and at $\frac{3}{4}$, one in middle of disc, two obliquely placed in disc towards termen, one at apex and one on lower part of termen connected with it: cilia light crimson, outer half on termen light yellow. Hindwings and cilia rather light crimson.

Anuradhapura, Ceylon, in December (Mackwood); one specimen.

Anticrates miltochorda, n. sp.

♀. 18-19 mm. Head light yellow, neck and sides of face red. Palpi red. Thorax light yellow, shoulders and a broad curved median bow red. Abdomen light crimson-reddish. Forewings elongate, costa gently arched, apex obtuse, termen slightly rounded, oblique; vermilion-red, with fifteen more or less large light brassy-yellow spots, *viz.*, one beneath costa near base, one towards dorsum near base, one in disc beyond these, one flattened triangular on costa at $\frac{1}{3}$, one above dorsum at $\frac{1}{3}$, two placed obliquely in disc beyond these, one towards costa in middle, one triangular on dorsum beyond middle, one triangular on costa at $\frac{2}{3}$, one elongate from disc beneath this to tornus, one elongate posteriorly expanded resting on lower part of termen, one elongate resting on costa at $\frac{5}{6}$, one elongate beneath this, and one at apex: cilia vermilion-red, on termen pale yellowish on outer half. Hindwings and cilia light dull crimson-red.

Khasis, in October; two specimens.

Anticrates venatrix, n. sp.

♀. 21 mm. Head deep yellow, lower part of face red. Palpi red, tip pale yellow. Thorax yellow, anterior margin and an irregular postmedian bar crimson-red. Abdomen pale crimson. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; crimson-red, with numerous clear yellow spots, *viz.*, a dot beneath costa near base, two large confluent triangular ones on costa before and beyond middle, two obliquely placed above and below fold near base, one Z-shaped in disc before middle, one towards dorsum before middle, one triangular on dorsum at $\frac{2}{3}$, one towards dorsum beyond this, a dot in disc at $\frac{5}{6}$, a curved subterminal series of six small marks, and a series of eight small distinct spots round apex and termen: cilia crimson-red, between apex and tornus yellow on outer half. Hindwings and cilia pale crimson.

Pykara, Nilgiris, at 7,000 feet, in April (Andrewes); one specimen. Very like *lucifera*, but considerably larger, and readily separable by the eight distinct terminal spots of forewings, which in *lucifera* are reduced by confluence, and also by the confluent costal spots.

Anticrates lucifera, n. sp.

♂ ♀. 13-14 mm. Head yellow, neck crimson. Palpi crimson, terminal joint pale yellow with a crimson lateral streak except towards apex. Thorax yellow, with an angulated crimson bar behind middle. Abdomen whitish-ochreous suffused with pale crimson. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; 8 and 9 sometimes stalked; crimson, with numerous yellow spots, *viz.*, a small one on costa near base, two large triangular ones on costa before and beyond middle, two obliquely placed above and below fold near base, three (two upper sometimes connected) in an oblique series between postmedian costal and dorsum before middle, an oblique series of five from $\frac{2}{3}$ of costa to $\frac{3}{4}$ of dorsum (of which the two uppermost are small, two discal irregular, dorsal large,

triangular), three others subterminal in disc, and a series of four small ones round apex and termen: cilia crimson, outer half yellow on termen. Hindwings and cilia light crimson.

Karwar, Kanara, bred in August (Maxwell); three specimens. Larva feeding on *Sideroxylon tomentosum* (*Sapotaceæ*); cocoons sent are semiovate, solid, apparently composed of dense silk treated with some sort of cement, attached to surface of leaf; pupa protruded in emergence through a slit at end, head and antennal sheaths coming away entire. Mr. Maxwell writes: "Larva looks exactly like cocoon, and practically the same shape; legs obscure, closely appressed to leaf together with whole undersurface; rather sluggish in habit, but walks about and is not attached to leaf in any way; head invisible. Must have some sort of covering which serves ultimately for a cocoon, but we could not make it out. Species apparently uncommon."

Anticrates thermastris, n. sp.

♀. 12-15 mm. Head yellow, sides of face and back of crown suffused with red. Palpi red, terminal joint pale yellowish towards apex. Thorax light yellow, with a red W-shaped bar. Abdomen dull light crimson. Forewings elongate, costa gently arched, apex obtuse, termen slightly rounded, oblique; vermilion-red, with a yellow dot beneath costa near base, and about fourteen yellow spots, *viz.*, two obliquely placed above and below fold near base, one on costa at $\frac{1}{3}$, an oblique one above dorsum at $\frac{1}{3}$, two connected to form a Z-shaped mark in disc before middle, one triangular on dorsum beyond middle, one oblique on costa at $\frac{3}{5}$, one beneath this in disc, three forming a series from $\frac{4}{5}$ of costa to tornus, one at apex, and one on lower part of termen: cilia red, outer half light yellowish except towards tornus. Hindwings and cilia dull light crimson.

Nilgiris, at 3,500 feet, in January (Andrewes); Ganesh Gudi, Kanara, in May (Maxwell); two specimens.

Aetherastis constellata, n. sp.

♂. 16 mm. Head, palpi, antennæ, thorax, and abdomen whitish-ochreous; antennæ moderately bipectinated; thorax with a blackish dot on each patagium, and two near posterior extremity. Forewings moderate, suboblong, costa moderately arched, apex rounded, termen rather obliquely rounded; whitish-ochreous; a basal group of five rather large blackish dots, *viz.*, one median near base, one subdorsal near base, one beneath costa at $\frac{1}{4}$, one below this beneath fold, and one in disc slightly beyond these: cilia whitish-ochreous. Hindwings pale ochreous-grey; cilia whitish-ochreous.

Wellawaya, Ceylon, in November (Green); one specimen.

Comocritis præcolor, n. sp.

♂. 15 mm. Head whitish-ochreous, face and palpi white. Antennal pectinations short. Thorax white, shoulders sprinkled with grey. Abdomen whitish. Forewings elongate, costa moderately arched, apex rounded, termen obliquely rounded; white; three suffused blotches of fuscous irroration, sprinkled with black specks, occupying most of disc from near base to near apex, separated only by curved white streaks, first blotch extending below fold and indistinctly to costa, second extended anteriorly to costa at $\frac{2}{5}$ and limited beneath by fold, third resting on tornus and not reaching costa; some slight dark fuscous irroration towards middle of dorsum; a narrow yellow-ochreous apical fascia attenuated downwards to middle of termen, edged anteriorly with some dark fuscous irroration. Hindwings grey; cilia white with grey subbasal line.

Trincomali, Ceylon, in November (Green); one specimen.

Comocritis nephelista, n. sp.

♂ ♀. 16-20 mm. Head and palpi white. Antennæ in ♂ flatly dentate strongly ciliated. Thorax ochreous-white, posteriorly tinged with grey.

Abdomen whitish. Forewings elongate, costa gently arched, apex rounded, termen very obliquely rounded; 9 and 10 stalked; whity-brownish irrorated with dark fuscous, more strongly posteriorly; a suffused white streak along costa from about $\frac{1}{3}$ to near apex: two small indistinct dark fuscous spots obliquely placed towards costa at $\frac{1}{4}$; a suffused whitish streak enclosing an elongate-semioval patch of stronger dark irroration along median third of dorsum; some indistinct whitish admixture in disc posteriorly, sometimes forming a suffused streak running to termen above tornus: four small indistinct cloudy dark fuscous spots round apex and termen: cilia pale whity-brownish with faint grey shades, beneath tornus whitish. Hindwings light grey; cilia white.

Kandy and Maskeliya, Ceylon, from March to June (Mackwood, Pole); four specimens. Differs from the rest of the genus by stalking of 9 and 10 of forewings.

Comocritis enneora, n. sp.

♂. 17 mm. Head and palpi white. Antennal pectinations very short. Thorax white, with two small dark grey postmedian spots. Forewings elongate, costa gently arched, apex rounded, termen rounded, rather strongly oblique; 3 and 4 connate; silvery-white; nine small roundish dark leaden-grey spots, *viz.*, one almost basal beneath costa, one in disc towards base, one towards costa before $\frac{1}{3}$, one on fold beneath this, one elongate in disc before middle, one above middle of disc, one on fold beyond middle, one towards costa before $\frac{2}{3}$, and one in disc beyond this: cilia white, base pale ochreous. Hindwings grey-whitish; cilia white.

Khasis, in May; one specimen. This example has the pupal case, with the head and lingual and antennal sheaths separated in one piece, still enclosing the abdomen.

Ethmia duplicata, n. sp.

♂ ♀. 30-32 mm. Differs from *hilarella* only as follows: abdomen with dorsal spots absent on two basal segments, reduced or absent on third; hindwings in both sexes as in *hilarella* ♀, but with apical patch wider and much more convex anteriorly, less produced beneath and not reaching middle of termen, grey apical patch in cilia also reduced and not reaching middle of termen. The characters of abdomen are as in *pullata*, but in that species the hindwings have a dark fuscous costal band on lower surface.

Patipola (6,200 feet), Maskeliya, Puttalam, Ceylon, in December and January (Pole, Fletcher); three specimens. Doubtless sometimes overlooked by collectors and mistaken for the commoner *hilarella*.

PROGRESS OF THE MAMMAL SURVEY.

Since the 31st March when the last report appeared, Mr. Crump has arrived in Behar and Orissa and the thanks of the Society are due to H. H. Sir Chas. S. Bayley, the Lieutenant-Governor of the Province, for having issued orders which have helped our Collector. Mr. Crump arrived in Daltongunj from Philibit in March and at once started work. He did not find much suitable ground there so soon left for Hazaribagh District where he still is. Unfortunately he had a severe sunstroke early in May, but he writes now that he is better and gradually resuming work. It is hoped to send him to Orissa shortly.

The reason that Mr. Crump was sent to Palamau and Hazaribagh districts was because the original types of certain animals were obtained there towards the latter part of the eighteenth century. The country of course has changed very considerably in many ways since then and the jungle and forests have in many places disappeared.

Mr. Shortridge after working the extreme South of Burma (Victoria Point) moved to Mergui and has been for the last 2 months on the Tenasserim River. As the rains are approaching and it is impossible to do more on the coast this season, he leaves shortly for Lower Chindwin and Mount Victoria and if possible he will endeavour to collect on the Lower Sittang River (SHWEGYIN) at the close of the rainy season.—Mr. Shortridge has also suffered slightly from a recurrence of the sunstroke which he had in Australia some years ago.

The problem of working a Mammal Survey in Burma has proved to be a much more difficult task than was anticipated owing to the immense amount of country to be covered, the number of places which must be visited, the density of the jungle, the difficulty and expense of transit and the fact that the fair weather season when any collecting can be done, is so short. In consequence of this and at Mr. Shortridge's urgent request, we have agreed to engage a fourth Collector, Capt. S. A. Macmillan, to work with him. Capt. Macmillan has been on a rubber estate in Tenasserim and not only is a keen hunter after Mr. Shortridge's own heart, but possesses local knowledge of languages, &c., which will be of great value to Mr. Shortridge whilst in Burma.

Major Mayor is still in Ceylon and has been for the last few months collecting in the Anuradhapura District, but he expects to finish up shortly and come to Bombay prior to commencing collecting in Central India.

MAMMAL FUND.

FURTHER LIST OF SUBSCRIPTIONS UP TO 20TH MAY 1914.

NAMES.	Amount.		
	Rs.	A.	P.
Amount previously acknowledged in Journal No. 4, Vol. XXII	76,760	5	2
Barton, C. S.	10	0	0
Bayley, The Hon'ble Sir Chas. (K.C.S.I., I.C.S.) ..	50	0	0
British Museum, The Trustees of, £100 (2nd Donation)	1,494	2	7
Bury, C. H.	29	12	0
Cox, Col. Sir P. Z. (K.C.I.E., F.Z.S., F.R.G.S.) ..	100	0	0
Fleming, Major A. M.	15	0	0
Government of Burma (2nd Donation)	3,000	0	0
Hunt, Capt. A. T. (C.I.E., R.N.)	15	10	0
Mackenzie, J. M. D. (I.F.S.)	57	9	0
Mosse, Capt. A. H. E.	50	0	0
Robinson, H. C.	28	4	0
Stables, Major A.	30	0	0
Tata, Ratan (2nd Donation)	1,000	0	0
Ware, F.	10	0	0
Whitehead, Capt. C. H. T.	25	0	0
Wilson, Capt. A. T.	50	0	0
Rs. ..	80,725	10	9
Promised.			
Government of Federated Malay States (2nd Donation) .. .. Rs. 1,750	....	..	..
Royal Society. £10 (2nd Donation) ..			
Interest credited by the Bank	36	15	10
Total Rs. ..	80,762	10	7

A PRELIMINARY ACCOUNT OF THE COCCIDÆ OF WESTERN INDIA.

BY

RAMRAO S. KASARGODE.

The coccidæ of Western India are a group of insects which have been very little collected and about which in this area very little is known. When one compares the enormous mass of information about them as they occur in Ceylon, which has been collected about them by Mr. E. E. Green, and the considerable amount of knowledge which we have of them in North-East India, particularly as they occur in tea, the paucity of knowledge as regards them in Western India is the more remarkable. And this lack of information is not because of any lack of importance. The scale insects have proved themselves among the worst of agricultural pests, and particularly pests of fruit trees. Although they are not so obvious in Western India as in some other parts even of India, yet they occur abundantly on many fruit trees. The mango tree alone has revealed a number of species living upon it and upon the Loranthus (*bandgul*) parasite which is always associated with it. They are very common on the fruit of the betel-nut palm—one of the most valuable of our fruit trees. They constantly occur on various citrus fruits, and in at least one case form a serious pest. And there are many others. All these are at present perhaps not very obvious, but there is no group of insects whose existence should be watched with a more jealous eye, as they spread when the conditions are favourable with marvellous rapidity, and what was an entomological curiosity belonging to the group of scale insects, has on several occasions in the history of agriculture, become in a few years a public menace.

The cause of the lack of attention devoted to scale insects in Western India has been probably the small amount of attention devoted to the growth of perennial crops like trees and shrubs. Most agriculture is that of annual crops, while the scale insects are peculiarly the pests of such plants as stand from year to year. Fruit culture is now increasing in importance: with this increase, the danger of these pests, and the interest they will evoke will undoubtedly increase.

A word of explanation will not be out of place in connection with the growth of individual species to the magnitude of pests. Most of the species except a few are quite harmless and are for the present only entomological curiosities. Mainly this is due to the inter-relation of parasitic and predacious insects on the one hand and scale insects on the other. The balance of life which now exists between the two classes of insects, one preying upon the other, may be disturbed in many ways. Cutting and clearing large mixed forest growth and establishing either tea or coffee has, for instance, enabled the tea and coffee pests to breed and multiply to such numbers that we recognize them as serious pests.

The following is an account of such species which I have been able to collect in Western India up to the present. The identifications have been made or confirmed in each case, with very great kindness, by Mr. E. E. Green, late of Ceylon.

Sub-family—DIASPINÆ.

Aspidiotus destructor, Sign.—This coccid has so far been only found on the mango tree (*Mangifera indica*), but practically every mango tree I have examined showed this scale to a greater or less extent. In many cases the scales fully covered the tender young branches and leaves. The upper as well as the lower surfaces of leaves harbour the species. In gardens devoted

to mango growing individual trees only here and there, are seriously affected, while the remainder are hardly attacked at all. I should nevertheless count it as a serious pest of the mango tree in Western India. It occurs commonly where mango trees are grown, and I have collected it in almost every district. It has been recorded also by I. H. Burkill on Mango trees at Nadiad (Gujarat*).

This species has been recorded as extremely destructive to cocoanut trees in the Laccadive Islands (Cotes)† but I have not noticed it on these trees on the West Coast of India.

Aspidiotus ficus, Ashm.—This scale is distributed almost all over the area we are discussing, and though mainly found on palms, it can feed on a large number of other plants.

I have received it, for instance, as a serious pest of citrus trees near Khed in the Poona District. The fruits in this case were simply covered by the scales. The insect was first described and determined from specimens collected on orange trees at Poona by Woodrow. It does not seem to be a serious pest, even in the same orchard every year, but is certainly one of the most dangerous pests to have on the trees. In other parts of India it does much damage to young orange trees, and orange growers in America have often been specially warned against it.

The insect is also found on the tree *Garcinia indica*, a plant allied to the mangosteen which grows in the Konkan. In this case it was closely associated with two or three other scales,—*Vinsonia stellifera*, Westw; *Parlatoria proteus*, Curtis, and a species of *Fiorinia*.

But the main habitat of the species is undoubtedly palm trees. Ornamental palms in botanic gardens in Poona are subject to serious attack. Betel-nut palms at Sirsi in the Kanara district were found to be attacked. And it has been collected on *Areca catechu* in Bombay by I. H. Burkill.‡

Aspidiotus lataniae, Sign.—This insect has been obtained from three distinct food plants, the bamboo, the *Citrus medica*, and the *gul mohur* (*Poinciana regia*). On bamboos it attacks both the leaves and the stem to the height of a few feet from the ground. On *Citrus medica*, a common Konkan fruit, the fruits only were attacked, there was no trace of the scale on the leaves or stems.

Aspidiotus rosei, Mask.—This scale has not previously been noticed in India to my knowledge. It is not mentioned in Mr. Green's list of Indian Coccids (Memoirs of the Department of Agriculture in India, Entomological Series, Vol. II, No. 2). It was found on the leaves of *Barringtonia acutangula* at Poona.

Aspidiotus orientalis, Newstead.—This coccid occurs on roses in many localities in the Deccan, being found both in Poona and Ahmednagar. It is fairly common on old rose trees in many gardens, and especially attacks the stems, sometimes killing the rose bushes. It would seem to be a pest chiefly of neglected and non-vigorous plants. It has been recorded on *Cycas revoluta* in Calcutta and on many other plants, such as *Dalbergia* and *Tamarindus*, but I have not observed it on these plants in Western India.

Aspidiotus curcumae, n. sp.—This is a species probably new to India named as above by Mr. E. E. Green, who will publish a technical description of it. It is found on an important crop, namely, turmeric. The plants above ground are free from the insect, but the rhizomes were covered with them. As the plants are propagated by means of the rhizomes, they are easily distributed by this means, and it would be a very difficult pest to

* Memoirs of the Department of Agriculture in India. (Entomological Series) Vol. II, No. 2.

† Indian Museum Notes, Vol. II., page 188.

‡ l. c.

control. It was discovered quite accidentally when examining the rhizomes for another fly pest.

Chionaspis dilatata, Green.—There are few scale insects more common than this on mango and banyan trees in Poona, where it occurs on both the upper and lower surfaces of the leaves. The females are rarely found, and when found they are always on the lower surface. The insect is known on palms in Calcutta, but its occurrence in Western India has not previously been noted.

Chionaspis decurvata, Green.—This scale occurs on bamboos in Poona, and so far has been noticed on no other plant. It was first described by Mr. Green from specimens occurring on rice from Calcutta.

Hemichionaspis aspidistræ, Sign.—This insect was first noticed on the *Loranthus* which so commonly attacks the mango tree (*bandgul*). It never occurs on the mango tree itself. It is also found occasionally on the banyan tree.

Parlatoria proteus, Curtis.—Has already been mentioned as occurring along with *Aspidiotus ficus* on the tree *Garcinia indica* in the Konkan.

Another species of *Parlatoria* has been found on *Michelia champaca* which Mr. Green thinks is likely to be a new species.

Fiorinia frontecontracta, n. sp.—This occurs on *Garcinia indica* along with *Aspidiotus ficus*, *Parlatoria proteus* and *Vinsonia stellifera* It has been provisionally named as above by Mr. Green, who will publish a technical description of it.

Fiorinia sapindi, n. sp.—Is another species of *Fiorinia* occurring on *Sapindus trifoliatus* described as new by Mr. Green.

Diaspis echinocacti, Bouche.—Occurs as a fairly common parasite of *Opuntia* (prickly pear) in Western India, and when the attack is serious it covers all the green parts of the stem. It has been noticed on *Loranthus* from Tanjore (Madras), but not on this plant in Bombay.

Diaspis barberi, Green.—Is a species very closely related to the last, and this *does* occur on the leaves of *Loranthus* in Poona.

Leucaspis indica, Marlatt.—This scale occurs commonly on mango trees, but does not seem to have been noticed in India previously. It was first identified in America on mango saplings introduced from India. The scales are completely hidden under the black mould so common in connection with scale insects but under this covering the scales completely encircle the tender branches. It may become a serious pest if not carefully watched.

Sub-family.—Lecaniinæ.

Lecanium hemisphericum, Sign.—This is one of the most widely distributed scale insects in the tropics and is the famous 'brown bug' of coffee. In Western India, it was first observed in an ill-kept garden, infesting crotons of many kinds. The way it covered the stems, leaves and tender branches showed it to be very destructive in this case, and the plants were in a dying condition. The plants were treated by severe pruning and burning all the prunings covered with the pest.

The same insect was found infesting vines of *Coccinia indica* at Thana. It is also a somewhat serious pest of *pomelo* plants in the Konkan, where it was found by Dr. H. H. Mann doing very considerable damage at Rajapur in the Ratnagiri district.

Lecanium nigrum, Nietner.—Is a black scale found in Poona and the neighbourhood on *Canna*, the castor plant and many others. Though it seems to have a large number of food plants, I have not come across it as a pest of any importance. It is curious to know that it has been found on cotton at Pusa (Behar).

Ceroplastes actiniformis, Green.—This insect, which has never been noticed in India before, has been found on the *Loranthus* attacking mango trees in the neighbourhood of Poona and also on the banyan tree. The scales are found singly distributed on the tender stems at the axils or on the midribs of the leaves.

Ceroplastes rubens, Maskell.—Has been noticed to occur attacking an unidentified fern in a nursery at Poona. The scales were all arranged in a row on the upper surface near the midrib of the fronds.

Pulvinaria psidii, Mask.—Has been found on many plants, among them being the mango tree, the guava tree and the tree *Bassia latifolia*. It is a bad pest on guavas. In this case the whole tree is covered by what has been happily described as "drops of white paint." The tree is recognisable from a distance by these white specks and also from the black mould which covers the leaves and tender branches. The scale attacks the green parts seriously and covers them completely. During the off season, the scales remain hidden under loose bark or knotty growths on the stem.

Vinsonia stellifera, Westw.—Was found in large numbers on the leaves of *Garcinia indica* in Bombay. I have not found it on any other plants in Western India though it occurs on many in Ceylon.

Sub-family—DACTYLOPIINÆ.

Dactylopius virgatus, Kkll.—Is an extremely common species found in almost all gardens in the neighbourhood of Poona attacking crotons. It is, in fact, a regular pest on these plants especially when they are planted close together. The scales spoil the appearance of the leaves, which become distorted and sickly in appearance.

It has also been collected on the adventitious roots of banyan trees by Dr. H. H. Mann near Poona. In this case it was found in no other part of the tree not even on the leaves, but on these adventitious roots, it was very common indeed.

Dactylopius nipai, Mask.—This species occurs on scattered plants of *Cajanus indicus* (*arhar* or *tur*). It apparently does litttle serious injury as only a very few of the plants had these scales crowded round the growing tip of the plant, in which position it is fatal. This species is said to be a pest on stored potatoes in Bengal, but I have never seen it on potatoes in Western India.

Phenacoccus hirsutus, Green.—This scale was collected by Dr. H. H. Mann on the banyan (*Ficus bengalensis*) at Mohol in the Sholapur district of the Deccan. It occurred like *Dactylopius virgatus* only on these roots.

Other very similar scales, not yet completely identified, have been found near the axils of the leaves of *banyan* trees in Poona.

Antonina anceps, n. sp.—Has been provisionally named by Mr. Green from a few specimens I collected from under the sheathing leaves of a reed bamboo. The scales were found crowded together in the axils, and some were seriously distorted in shape on account of the number of them occupying a limited space within the sheathing leaf.

Sub-family—ASTEROLECANIINÆ.

Asterolecanium miliaris, Borsd.—Is the only representative of this sub-family yet found in Western India. This scale was found on two ornamental bush bamboos in Poona to a very destructive extent. The scale was crowded on the undersurfaces of the leaves.

Sub-family—MONOPHLEBINÆ.

Icerya seychellarum, West.—This scale is quite rare. Only a few specimens were found on mango shoots. It has not been observed on any other plants in Western India.

Icerya aegyptiaca, Dougl.—Is also a rare scale, but found in a few cases on the leaves of *Ficus bengalensis* (*banyan*).

This list of scale insects in Western India is only a preliminary one. Many others have been collected but they are omitted until the identification is certain and complete. The data given above has only been possible on account of the help and co-operation of Mr. E. E. Green, who has taken the greatest pains to identify the collections sent to him. I am deeply grateful to him for thus enabling me to render my observations of definite and permanent value.

REVIEWS.

A TEXT-BOOK OF MEDICAL ENTOMOLOGY.

BY

W. S. Patton and F. W. Cragg; Madras, Christian Literature Society, 1913. Pages xxxiii + 768; 89 Plates and 3 Text-figures. Price Rs. 15-12-0.

The study of Diseases, especially in the Tropics, of late years has shown very forcibly the highly important part played by Biting Flies, Bugs, Ticks, etc., in the dissemination of the parasitic organisms which cause such diseases, so that some knowledge of Entomology has become an absolute necessity to every medical man. The control of such diseases being as a rule brought about most simply by the control of the insects which convey them from host to host, it follows that some knowledge of the insects concerned must be an essential requisite of everyone who has to deal with cases of such diseases. Hitherto the inquirer, who has wished to acquaint himself with published information regarding the classification, structure and habits of even the commonest and most important of the numerous insects which have already been incriminated as Carriers of Disease to man and animals, has had to rely on compiling information to the best of his ability from the hundreds of text-books and papers, many of which are accessible only with great difficulty and almost all of which are published in various languages and scattered throughout periodicals and reports dealing with entomological, medical, veterinary and sanitary work. It is true that Colonel Alcock's "Entomology for Medical Officers," which appeared some two years ago, provided the first elements of knowledge on the subject, whilst text-books such as Brumpt's "Precis de Parasitologie" have included a short resumé of the groups of disease-carrying Arthropods, but the text-book now under review furnishes the first—and up to date the only tolerably complete—general account of the groups in question, dealing especially with the internal anatomy of the various families, a point of considerable importance to the isolated student who is thrown upon his own resources to investigate the problems of the transmission of pathogenic organisms.

This Text-book is divided into twelve chapters, the first ten of which deal with the general anatomy and physiology of the blood-sucking Diptera, the classification, structure and bionomics of the various groups of these flies and of the fleas, bugs, lice, ticks, linguatulids and water-fleas: whilst the last two treat of Laboratory Technique and the relations of Arthropoda to their Parasites.

The description of the general structure of Diptera (pages 8-150) is very complete and must have entailed a vast amount of examination and comparisons not only of specimens of the flies themselves but of the terminology of the various parts as laid down by different authors. Under the head of Chætotaxy it might have been advisable to have added a note of warning to the student regarding the variability of some of these hairs.

In the accounts of the various families of Diptera excellent keys to the genera and species are provided from the work of Specialists: these keys are often translated from obscure foreign publications and are therefore doubly useful. Excellent practical notes also occur scattered through more technical descriptions, as where, speaking of Sand flies (*Phlebotomus*) the authors write, "If a light is kept close to the bed, fewer will enter the net," an observation which may be commended to sufferers from the bites of Sand flies.

The section on Mosquitos (pp. 187-270) is very full, though information is necessarily restricted to those forms known or suspected to carry disease, and this section ends with some excellent practical hints on collecting, breeding and feeding mosquitos for experimental purposes; this last observation applies also to the chapters on other groups, such as the Tabanidæ and Muscidæ, whilst pages 411-424 contain practical hints on collecting, preserving and dissecting blood-sucking Diptera.

Fleas have of late attained unenviable notoriety in India as the carriers of plague from rats to man and Chapter V (pages 434-477) of the present book provides an excellent summary of the structure, life histories, habits and classification of fleas as a whole. Most of the original literature on Fleas, it may be noted, is contained in scattered and costly publications which are quite out of reach of the ordinary student.

Chapter VI (pages 478-526) contains an account of the blood-sucking Bugs, of which the Bed-bug is the commonest and most important in India. Our experience does not confirm the statement made here of Reduviidæ, that "as a rule they are diurnal in their habits;" we have always looked on this family as thoroughly nocturnal.

Chapter VII (pp. 527-564) supplies a long-felt want by providing in English a general account of the Anoplura, or lice, which are usually slurred over in most text-books. Much the same remarks are applicable to Chapters IX and X, which deal with Mites, Linguatulids and Water-fleas. Chapter XI, on Laboratory Technique, contains practical hints on instruments and methods for dissection, staining, etc., and will be found invaluable to the isolated worker.

The whole book is well planned and excellently carried out and should fulfil the objects for which it was written, which is defined in the Preface as the supplying of the needs of fellow-workers by compiling a guide to the relations between arthropods and disease rather than a general text-book of entomology. The paper and printing are good, though the excessive weight of a book of some 800 pages necessarily detracts from comfort in handling it. The Plates contain hundreds of original figures, excellently drawn and reproduced and adequately illustrating the text. We can cordially commend this book to all interested in the subject of insect-borne diseases—and who, in a country such as India, can fail to be interested?

T. B. F.

"MY SOMALI BOOK," A RECORD OF TWO SHOOTING TRIPS.

BY CAPT. A. H. E. MOSSE, F. Z. S., LONDON,
SAMPSON LOW, MARSTON & CO., LTD., 1913. Rs. 9-6.

In an early Volume of the Journal, Major (now Colonel) Swayne's well known book "Seventeen Trips in Somali land" was noticed and since then many books have appeared on sport and natural history in that country though none to compare with that work. This, however, cannot be said of Capt. Mosse's book, which though only the record of two expeditions is a worthy successor to "Seventeen Trips in Somali land," whose author by the way has written an introduction, and now that that country is practically closed to sportsmen is all the more valuable.

Capt. Mosse's two trips consisted of one of under four weeks and another of two months, and during the latter it had been his intention to penetrate Abssyinian territory, but owing to a mistake of the Post Office the necessary permit did not arrive till too late. In course of the two

expeditions 19 different kinds of game were obtained, examples of nine of which were kindly mounted and presented to the Society's Museum by the author.

In the first thirteen chapters details are given of the different expeditions with descriptions of hunts after various kinds of game as well as general remarks on the various animals seen and shot, while the four remaining chapters are devoted to general notes and discussions, protective colouration of animals and rifles for big game.

The Somali leopard seems, if possible, to be a more wily animal to shoot than its Indian cousin. The usual way appears to be to sit in a zariba with a bait tied up outside, very different work, our author tells us, to sitting over a goat in a machan in this country. From his experience Capt. Mosse considers the lion the most dangerous game animal and in this he is supported by Mr. Selous; Colonel Swayne, however, puts the buffalo first and the lion together with the tiger, second. Other sportsmen have not such a high opinion of the lion and Mr. Maughan in "Wild Game in Zambezia" seems even to consider lion shooting poor sport.

In Chapter XV, Capt. Mosse joins issue with Mr. Selous on protective colouration in animals. The principal point of discussion is the striping of zebras which Mr. Selous says is not protective because the lion, which principally preys on them, hunts by scent and also hunts by night. To this Capt. Mosse answers that as regards hunting by scent "it is by no means certain as regards the cat tribe" and he goes on to say "the tiger and panther hunt mainly by sight and hearing." This, however, we venture to think does not prove that the lion may not hunt more by scent than the tiger, but on the other hand as Capt. Mosse says, Mr. Selous has produced no evidence to show that the lion does hunt by scent.

In the nocturnal habits of the Carnivora Mr. Selous considers another stumbling block to the protective colouration theory of the zebra, and here again Capt. Mosse points out that he "fails to take into consideration the great length of time during which evolution has been going on and that he assumes without sufficient justification, that the protective colouration of the zebra was brought into being by conditions precisely similar to those obtaining at the present day."

Capt. Mosse argues that the habits of both animals have changed and that at one time both were inhabitants of wooded country and that the lion hunted by day. "When this was his habitual practice it must have been an advantage to his prey to be unconspicuous. It is not difficult to imagine the process of evolution that took place; the zebra and the lion to begin with, both becoming less easy to see. It is not easy to be sure of the order in which changes occurred, but we may perhaps assume that to counteract the difficulty of seeing their enemy with his increasing stealthiness the zebra took to the plains, "while" as time went on the lion, finding it more and more difficult to capture his prey, would often find that it was only in the dusk, after going hungry all day, that he achieved success."

"A crepuscular habit once acquired and accompanied by a gradually increasing power of vision in a dim light would develop almost inevitably into a nocturnal one. The antelope or zebra meanwhile would develop still more its powers of scent and perhaps hearing, and, in the case of the latter, become more and more wholly a denizen of the plains." Now it is admitted by nearly all hunters that the zebra is harder to see at dusk, would it therefore be as easy for the lion to see it by night as by day? If not, why should it have taken to hunting by night? It may be said that the reason is that its prey would then be resting and be easier to approach, but on the other hand "C. H. S." in a recent number of the *Field* after writing about the animals the lion feeds on, says "none of the animals mentioned above

show any great fear of the lion or leopard: they have grown accustomed to them. They can be found grazing peacefully in close proximity to them, and do not trouble to move out of their way unless a determined rush is made at them." There are many other points in this interesting chapter which one might touch on, but this is hardly the place, and while we do not think Capt. Mosse has quite proved his case he has brought forward many sound and interesting arguments.

The book is illustrated with many photographs, chiefly taken by the author, and pen and ink sketches of various subjects by Lt. D. D. Haskard, R A.

"WILD LIFE ACROSS THE WORLD."

WRITTEN AND ILLUSTRATED BY CHERRY KEARTON—LONDON. HODDER AND STOUGHTON, £ 1.

The brothers Kearton have long been well known for their excellent photographs of British birds and their nests, many of which have appeared in book form.

Except in special cases these kind of books have been greatly overdone, and we think Mr. Cherry Kearton, the photographer of the combination, has been well advised to try his hand at big game photography, which is probably more exciting and yields more valuable results. Mr. Radclyffe Dugmore and Herr Schillings have already shown what wonderful pictures can be obtained over kills and water holes, but Mr. Kearton has gone one better than these photographers and has taken not only single photos of many dangerous animals, but also rolls of moving pictures which have delighted visitors to numerous Cinema houses.

Various parts of the world were visited by Mr. Kearton in search of material for his camera and in the present book he tells us of trips to the States, Borneo, India and East Africa. The last named country gave the best results and most of the illustrations are from photographs taken there. Mr. Kearton on one expedition in East Africa was accompanied by several American Cow-boys who lassoed different animals, such as Giraffe, Warthog, Lion, and even Rhino, before his camera. This trip yielded ample material for moving pictures and stirring stories of the capture of the different animals are given in two well illustrated chapters.

From the point of view of readers in this country, the account of the author's Indian Trip is disappointing and the results reproduced are poor, as compared with those from other countries. Probably, however, the hurried nature of the visit to India accounts for this and we doubt not, but that if Mr. Kearton had more time, he would have been able to obtain just as interesting photos in this country as elsewhere. It is unfortunate that the author has not seen his way to reproduce the photo of the tiger mentioned on page 158.

Like many tourists and other visitors to India, Mr. Kearton is able to speak on tiger shooting with only a few days experience of these animals. He seems to think that the tiger is not a noxious animal but probably in many places it does as much damage as the lion, though, of course, it is nowhere so numerous. Mr. Kearton too does not seem to have realized that the habitats of the two animals are not quite the same and it is not usually possible in India, as a rule, to shoot tigers as lions are shot in Africa. "And this reminds me of another difference between Africa and India. In the Dark Continent men take risks. They go out on foot, to encounter the lion. They are real sportsmen because their object is to destroy a noxious beast,

an enemy of every other living thing, and they give him a sporting chance of life, by meeting him on his own ground, with their nerve and their rifle against his cunning and strength."

"In India the sportsmen attacks the tiger from the security of an Elephants' howdah, after that tiger has been routed out of the jungle haunts by unarmed beaters or else he sits up in a tree, secure from his quarry and waits until the latter comes along to tear up some terrified calf or goat. No, save in rare cases, tiger-shooting in India is an ignoble business ; and nine out of ten tiger skins in English country houses merely mean that of a son of that house shot a beast which had no chance of retaliating on the man who killed him. Personally I set no value on such 'trophies .' I would much sooner have photographed the tiger and let him go on his way. Had I wanted to kill him I would have taken my chance on foot, in fair fight, as the lion-hunters do in Africa."

On this point we would like to have the views of our members who have had experience of both animals.

The book is introduced to the public by Mr. Roosevelt, who met the author in East Africa, and his brother writes a "Foreword"—a biography of the author, after reading which one is inclined to say "Defend me from my friends!"

Besides photos of big game there are many interesting pictures of birds reptiles and insects and the letterpress contains good accounts of the difficulties and excitements in obtaining the various pictures.

MISCELLANEOUS NOTES.

No. I.—NOTES ON SOME MAMMALS OF SIKKIM.

In Blanford's Mammals of India the Thar is given as a native of Sikkim on the authority of specimens procured by the late Mr. Mandelli from native shikaris. I knew this gentlemen well, and I know that these men went far beyond the boundaries of Sikkim; and as during my four previous visits to this ever delightful country, I had never been able to get a specimen or any certain proof of its existence, I had always been sceptical. Mr. Gammie, who lived many years in Sikkim, and who wrote the Chapter on Mammals for the Gazetteer of Sikkim, published in 1894, omits any mention of this animal. When at Lachoong in March last I saw at about 10,000 feet elevation on a rocky steep covered with brushwood a large animal which the Bhatias called Thar, and being unable to approach it myself sent a native to try and kill it. Three days afterwards he sent down the head of a very large old Serow (*Nemorhædus*) whose horn was 10 inches long, (the other was broken off when the animal fell from a cliff). On enquiry I found that this animal is generally called Thar, by the Paharias and planters who often kill them in the low hot vallies of British Sikkim. But Mr. Claude White tells me that during his long residence in the country he procured one specimen of the real Thar, whose head is now in his possession in England, and that he has reliable information of its existence in two places, namely, the eastern Singalelah range, north of the Rummam valley and the very steep and inaccessible mountains on the west side of the Tista valley between the Talung valley and the Zemu river which joins the Lachen valley just above Lamting.

It is much to be hoped that some European, who must be a really active and skilful mountaineer, will endeavour to explore this untrodden part of Sikkim and learn something more of this animal. April and October would be the best time to attempt it.

When I was at Lachoong with the late Mr. Blanford in September 1870, my Lepcha shikari killed a large Wild Dog, an animal which I had never seen alive until March last, when I saw one which had been eating the carcass of a dead Yak within a mile of Lachoong. Blanford in the Mammals says that the Malayan Wild Dog *Cyon rutilans* occurs in Tennasserim, but it is not known whether the Wild Dog of Northern Burma is this or the Indian species *Cyon dukhunensis*. Gammie in the Gazetteer of Sikkim, p. 236, says that the natives are very positive about the occurrence of two Wild Dogs, which differ in size and habits, as well as in colour. "The large sort they call Hindu, and say that it goes in pairs or in parties of 3 or 4 and is of a brownish colour with a black muzzle; the other sort which they call the Mussalman is smaller, of a uniform reddish colour, and going in packs of 10 or 12. The Hindu sort is in great request among native cattle doctors, who consider every atom of its body, including the bones, an infallible remedy in rinderpest. The Nepalese also declare it to be a sure remedy in dysentery and other diseases. The Mussalman sort is not generally of such high repute as medicine, and by some is considered worthless."

Before reading this I received exactly the same information from two English-speaking Nepalese of such position that I cannot doubt their belief in its accuracy, namely, Biroo Singh, Forest Ranger of the Tonglo forests, who further says that when the Gurung shepherds come to Sundukpho during the rainy season the Mussalman Dogs, which he has seen in packs of 12 or 13, kill many sheep. My other informant, Sirdar Bahadur Bhimdal Roy, was formerly forest ranger on Tonglo, where he procured for the late Mr. Knyvett and myself many new Lepidoptera in 1886, and is now Deputy Superintendent of Police at Darjeeling.

Mr. Lister of Pashok tea estate, where he has lived for many years, also believes in the existence of two species or varieties of Wild Dog, and tells me that his cattle are often killed by them. Mr. Claude White, though he knows nothing of the two varieties, tells me that he occasionally had his cattle killed by Wild Dogs at Gangtok. It seems very desirable that specimens of the two sorts should be procured and examined by a competent naturalist, as it is possible that the smaller sort may be the Malayan Wild Dog or an intermediate species. In the Calcutta museum is only one specimen of the Wild Dog procured many years ago in Sikkim, which, though too badly stuffed to judge from, seems to differ from that of the Plains in its smaller eye and much longer fur and tail.

Lastly, there seems to be little doubt that the Malayan bear which has not, so far as I know, been recorded in the Dooars or Terai occurs in Sikkim and Mr. Gent, the Divisional Forest Officer at Darjeeling, will probably be able to confirm this.

H. J. ELWES, F.R.S.

March 1914.

No. II.—A RECORD TIGER.

(*With a photograph.*)

On the 11th of this month at the 'Koovat Kho,' 5 miles north of Sipri, our Summer Hill Station, there fell to His Excellency the Viceroy's rifle a tiger which measured as follows:—

Total length	.. .. ..	11 feet	6 inches
Head and Body	.. .. ..	8 ,,	2 ,,
Tail	.. ..	3 ,,	4 ,,
Height at Shoulder	.. ..	4 ,,	0 ,,
Girth	.. ..	4 ,,	6 ,,
Girth of fore-arm ..	.. ..	1 ,,	9 ,,

The tiger was measured along the curves of the body, of course before being skinned, in the presence of His Excellency Lord Hardinge and myself and our staffs, a party of about 25 people.

I enclose a photograph of the tiger.

Perhaps you would like to put the measurements and the event on record in your Journal.

M. SCINDIA.

Jai Bilas, Gwalior, 15*th April* 1914.

No. III.—THE USE OF A HYÆNA'S (*HYÆNA HYÆNA*) TONGUE AND FAT AS MEDICINE.

As I should like to seek information on a certain subject I do not think I could do better than address you and trust you will excuse the liberty I have taken.

A short time ago in company with two friends I went out pigsticking and whilst beating the country we turned out a very decent sized hyæna and managed to account for his death by spearing him.

As we wanted the head and skin we asked our shikaries, mostly Kolis by caste, to skin the animal but this they refused to do, though later by great persuation we managed to get the animal skinned. We brought home the skin and head and the Kolis took away the meat and fat. As soon as news went around that we had killed a hyæna, people from almost all the neighbouring villages came to us and asked us for a little fat and a piece of the hyæna's tongue. Upon enquiring the reason for such a request we were told that the fat and tongue was a certain remedy for rheumatism and malformations of any bones. In fact these people expressed their willingness to give us whatever we wanted. When we told them what we did with the fat, half of these people went to the village where these Kolis were stopping, but whether they got what they wanted I do not know. What surprised us most was when a Bania came to my place and brought with him his hunch-backed son and wanted a piece of the tongue to apply to his son's back, stating that if he applied the tongue to his son's back the lump on it would disappear. I felt very sorry that there was no tongue left as I should have liked to watch the result. I have also been told that a hyæna's tongue is unsurpassable for the cure of splints in horses, but how far this is true I do not know.

I shall now feel much obliged if you or any of the subscribers to your Society will let me know whether there is any truth in the popular belief that the fat and tongue of a hyæna are the best remedies for rheumatism and other malformations of bones and, if true, what qualities there are in a hyæna's tongue to be able to remove splints in a horse's leg.

N. V. RINGROW.

Assara *via* Deesa, 21*st April* 1914.

[We publish this as we cannot remember ever having heard such things being attributed to the hyæna in India, but in Anderson's Zoology of Egypt, Mammalia, Mr. Beadnell, in some field notes on the same species says: "The natives (in the Nile Valley) are very keen to obtain the heart, which they eat, believing that they thus obtain the courage (*sic*) of the hyæna. They also cut off the whiskers, if they get a chance, and keep them as a charm. The meat is also readily eaten by the poorer among them, and I found myself that the flesh taken from the head was not at all bad." This animal is usually looked down on in India by the natives as being cowardly.—Eds.]

No. IV.—A BROWN VARIETY OF THE SLOTH BEAR (*MELURSUS URSINUS*).

Last Xmas when shooting in the Hazaribagh Jungles I shot a Brown Bear. Can you or any of the readers of your Journal tell me what this is?

There are no Brown Bears in the plains and it cannot have strayed there from Kashmir. Nor was it like a Kashmir Bear. It was more like the ordinary sloth bear of the plains, but brown instead of black. As far as I can make out its coat is shorter, softer and more curly than that of a black sloth bear and as it came towards me across a sandy nullah in the open it looked different from an ordinary black bear in shape, being much broader and having a more clearly defined outline.

It was heavy but I did not weigh it. It taped just over six feet. Its colour is a uniform brown, except its snout which is grey with a silvery gloss about it and the horse shoe mark which is yellow. Its eye I would call a very Irish eye. It is not brown but blue, a deep but very distinct blue as to the iris, with a pupil very dark blue or black. I have never seen or heard of such an animal, and I cannot find anything about it in my book. My shikaris had never seen one before. A friend tells me that the jungle men in the Orissa jungle tracts say there are two bears in their jungles, one black and the other red. This is the only suggestion of a red bear in the plains that I have ever heard of. Is there such a bear known?

I have compared the skull with two sloth bear skulls belonging to bears of about the same size and there does not seem to be much difference in them except that the one belonging to the Brown Bear is much broader.

C. SAUNDERS.

35, CHOWRINGHI, CALCUTTA, 19*th April* 1914.

[As we have not had an opportunity of seeing either the skin or skull it is difficult for us to offer an opinion but it may be a case of erythrism or partial albinism in the common Indian Sloth Bear (*Melursus ursinus*) of which R. A. Sterndale reported several instances in Volume I, page 69 of the Society's Journal.—EDS.]

No. V.—STRIPED WEASEL IN ARAKAN.

The Society has recently received the skin of a striped weasel, *Mustela strigidorsus*, Gray, from Mr. W. S. Thom. in Arakan. The occurrence of this weasel in Arakan is of considerable interest as it links up the previous known distribution, which was Sikkim and Tenasserim! Originally described in 1853 from two of Hodgsons specimens obtained in Sikkim, the only other known specimen from outside that country was collected by Signore Fea some thirty-five years later at Thagata in Tenasserim and recorded by Mr. Oldfield Thomas in Annali del Museo Civico di Genova in 1892.

N. B. KINNEAR.

BOMBAY NATURAL HISTORY SOCIETY'S MUSEUM,

April 1914.

No. VI.—NOTES ON THE SMALLER KASHMIR FLYING SQUIRREL.

I send you herewith six skins and skulls of *Sciuropterus fimbriatus*, which were obtained in June 1912 and June 1913 in Konani and Kothi Kanesar, Chakrata Hills. All the specimens were shot in the evening as they left the bungalow to go to feed.

My attention was first drawn to them by being wakened up about 4-30 a.m., by the noise made by these squirrels running about on the wooden ceiling and by a plaintive call of "Uñ Uñ" rather like that made by a monkey.

Their usual routine was to commence to move about on the ceilings about an hour and a half before dark and to come out when it was just too dark to see anything but the jump from the roof to the branch of a deodar about 4 feet away. They would then run up the tree for 10 or 15 feet and sit down either to "wash their faces" like a rat or rabbit or to wait for another of the party to join them.

They then dispersed for the night to feed and about 4 a.m., a thud on the roof would proclaim the return of the first of them. This would be followed by some scurrying about. Thinking that there might be a nest of young ones, I spent some four days in the roof hunting for them—I was, however, never able to find an animal, though in the evening they would appear again. Eventually I found some nests in the partition where they evidently lived and probably hibernate.

I tried to snare them but always failed, as they bit through the thin wire immediately they found they were caught, and in the end I had to shoot them as they left the building. They evidently do not always return to the same place, as some nights only two, and other nights four left the bungalow. This may have been due to their being so much disturbed. In 1912 I shot four in the Konani bungalow but no more could be got out of it, and as they were all males I began to wonder if the sexes separated except during the pairing season.

I then went to Kothi Kanesar bungalow. Here they made more noise than ever and evidently one old male tried to hunt the others out. This bungalow is one that is not so often occupied and in consequence the squirrels seemed to come out much earlier in the evening. Here, after amusing themselves chasing each other on the bare stone wall, they usually got on to the roof and planed to the nearest deodar about 20 yards away—one, however, made straight down the khud side to a tree quite 200 feet below. In this bungalow I got more specimens but they were again all males.

In June 1913 I was again at Konani and there were again four more tenants of the bungalow using the only entrance which I had left the year before. I shot two more, one being a male and the other a large female.

In the roof were large numbers of apricot stones and a few walnut stones each with a single hole bitten out. They were probably brought here by the squirrels though they might have been brought by rats. I have seen twenty or thirty mango stones below the hole in a tree from which I got a *Petaurista inornatus*. This tree was an oak and the nearest mango was not within a mile and a half, so it is probable that the apricots and walnuts had been brought from the village a mile away. The specimens were all shot in the evening so that the stomachs were empty except for lumps of gum or resin.

The usual food of this species is the seed of the various conifers and these animals must to a great extent prevent the regeneration of forests. I have seen the ground in Kashmir strewn with thousands of green cones destroyed by flying squirrels and in places in these hills you may see much of the same thing. They also eat the pines of the conifers and lumps of gum and resin and various fruits.

The only female I obtained showed no signs of being in young nor of having just finished suckling.

The colour of the specimens varies from rufescent to dark grey, about half of one colour and half of the other. The red specimens appear to be older animals.

The squirrels were smothered with a large red flea (I send you some specimens) which were not averse to a human diet.

H. T. FULTON, Major.

Dhera Dun, *March* 1914.

No. VII.—VARIETIES OF MARKHOR HORNS.

With reference to the interesting photograph published in your last issue of a Markhor shot by Capt. Edwards, it may interest him and others to hear that a similar head has been seen this winter by a British Officer in the Barmai district. The horns were estimated to be about 45 inches in length and seemed to be exactly similar to those of Capt. Edward's animal. Mayadass,where Capt. Edward shot his head, and Barmai, where the second head was seen,are close together in the Haramosh district, and it is extremely probable that Markhor seen in Barmai in the winter go up to the top of Mayadass in the summer: the new head might be some relation of that shot last summer. Perhaps some of your readers might be able to offer some suggestion as to what conditions gave rise to this very rare type. I believe a similar but smaller head was shot a few years ago in the Chilas District.

J. F. TURNER, Capt., R.E.

Gilgit, 22*nd February* 1914.

[Capt. Logan Home writes to us that "last year (1913) in Baltistan I saw no less that 5 Burhel-shaped heads (rather more so than the one in the photo in the Journal) in one herd; and there is a very much more remarkably shaped head in the Mess of the 38th Dogras here, which resembles an Oorial if anything." Eds.]

No. VIII.—A FEW NOTES ON THE WILD GOATS AND *FERÆ NATURÆ* OF NORTHERN ARAKAN, BURMA.

Until posted to the Hill Tracts of Arakan in September 1906 I had not had the good fortune to bag a Burmese Goral, the *Nœmorhedus griseus* of naturalists or the red Arakan Serow *Capricornis sumatraensis rubidus,* although some years ago when after Gaur I had once before in the year 1898 caught a glimpse of a Goral as, after uttering its strange sneezing, bark or scream, it jinked and bounded away down a hill side on a precipitous slope of the Thayetmyo Yomahs. I was fortunate enough however at that time to bag in the same locality on the summit of "Pézwa," a hill which overlooks the Mindôn or Matôn valley from a height of 5,000 feet, a fine male specimen of the Burmese or Sumatran Serow *Capricornis sumatraensis* the "Tawseik" or "Tawmyin" of Burmans about which, and the red Arakan Serow *C. s. rubidus,* I shall have more to say hereafter, for I am of opinion that three animals of the last named variety recently shot by me in the Arakan Hill Tracts, *viz.*, two females and a male, are a distinct form, being slightly smaller and more rufous in every respect than the animal bagged on the heights of Pèzwa, which besides being larger had also a shaggier coat and a longer mane and was of a distinctly darker or blackish grey shade. Blyth and Blanford both agree in uniting *C. s. rubidus* and *C. sumatraensis* whilst R. Lydekker considers that the former appears entitled to be regarded as a third local race distinguished by the extremely red tinge of the coat. Blyth originally described the red type as a distinct species in 1863 under the name of *Capricornis rubida.*

In my humble opinion, and I give it for what it is worth, it appears to me that although they belong to the same species they are different at any rate as regards colour and size and should therefore be given separate designations. Then again, although I have not come across the animal itself in Arakan or Burma proper, I have seen heads and horns of a third or black race of Serow with the hair of the frontal portion of the head which was of a jet black colour, whilst the horns which appeared to have the usual curve backwards and outwards from within a few inches of the tips, were, if anything, longer by an inch or two and more

massive at the base than is to be met with in those of either *N. s. rubidus* or *N. sumatraensis*. These black Serow were I am told for the most part nearly if not quite black and were shot in the Chin Hills and are probably either *N. s. robinsoni* or the Malay Serow *C. s. swettenhami*. If I am correct in my surmise it would therefore appear as if there were three races or allied forms of Serow to be met with in Burma. But as I am treading on new and dangerous ground, not being an expert on these matters, I may be mistaken and am open to correction. I see from an article written by Mr. C. B. Moggridge which is published on page 981 of the Journal of the Bombay Natural History Society, Vol. XIX (No. 4), that the black and the rufous variety exists in most part of Upper Burma. It would be interesting to know whether the rufous-red variety shot by him was the *C. s. rubidus* or only a form intermediate between the black and the red or in other words the *C. s. sumatraensis* and whether the black variety which he has not named was *C. s. robinsoni* or *C. s. swettenhami*. With a view to having the head mounted I succeeded in saving the mask and skin of the last animal shot by me here in May this year, a very old male of the *C. s. rubidus* type. The following, although a somewhat clumsy description, is as accurate a description of this animal as I was capable of putting down on paper at the time.

Height 35½ inches; length from nose to tip of tail 54 inches; girth of body 38 inches; length of both horns 9½ inches, girth of ditto at burr or base 5¼ inches.

The hair of the upper portion of the back and body extending from the tail to neck and down either side for a short distance, was of a dark brown or rusty red colour. The back and upper portion of the body and legs was of a distinctly darker brown colour than the upper or under portions of the neck which was of lighter brown or yellow colour whilst a dirty white or light yellow patch extended from the chin to the throat and chest for a distance of about a foot. A distinct black line or dorsal stripe of short black hair, from a quarter to half an inch in width, extends from the root of the tail along the back where it disappears on meeting a short but perceptible mane of about two or three inches in length of a dark brown colour which extends from the neck backwards along the back for a distance of about 15 to 18 inches. The coat along the whole of the back portion of the body from tail to mane for some 8 to 10 inches down and along either side of the dorsal stripe and for about three quarters of the animal's length has a grey or grizzled appearance, the brown or red being somewhat profusely interspersed with grey or white hairs. These grey hairs were nearly if not entirely absent in the case of the two females shot by me in the same locality and I am of opinion that the grey or grizzled appearance along the back of the red variety is only met with or is more marked in the case of very old males. The ears were edged and tipped with very short black hair whilst the hair inside the ears which was thin and longer though scanty, was of dirty whitish appearance. Hair on lips of a dirty white or yellow colour. Hair on body, neck, head and ears generally very short and scanty in some places and of a dirty yellow or light brown appearance on inside of legs and down to the hoofs. Hair on stomach and legs longer than on rest of body although not plentiful. Tail thinly clad with a bunch of coarse hair running to a point. The tail alone without the hair measured 3¼ inches and with the hair 4½.

Tail bare underneath. Colour of hair on tail of a dark brown colour verging on black. I am afraid many of the details recorded have been noted before and are doubtless worthless to a naturalist but they may nevertheless interest other sportsmen. I regret to say that I did not record at the time it was shot an accurate description of the Serow bagged

on Pidwa hill in the Thayetmyo Township already referred to and unfortunately neither the skin nor the head is now in my possession having been accidentally destroyed in a few years ago. I do not either now, I regret to say, possess the skin or head of another animal, an old female, shot by me in the Bilin Myook District in 1892 a good description of which is given on page 184 of the work "Wild sports of Burma and Assam." Although the description given there might have been better, it is sufficient I think to enable one to identify it as the same type of animal which was shot by me in Thayetmyo in 1895 and which I take to be the *N. sumatrensis*.

Shortly after my arrival in Paletwa I heard of a famous horse shoe shaped rocky plateau known as "Kyauk-pan-daung" or translated literally from Burmese, the flower covered rocky hill, some 4,500 feet in height which was situated some 20 miles to the east of my Headquarters and to the top of which a rough bridal path existed, where it was also rumoured that an occasional tiger was to be met with along its open grassy tops whilst the precipitous grassy slopes and rocky cliffs which skirted the plateau on its western face for a distance of nearly 8 miles was said to be the resort of gaur and serow. I made a mental vow that it would not be long before I visited the plateau and took toll of the game to be found there. I had been told before my departure for Arakan that there was little or no big game shooting to be had in the Arakan Hill Tracts owing to the large number of guns which were in the possession of the hill people and because of the dense bamboo jungle and undergrowth which existed everywhere, the result of hill clearing and annual firing for purposes of cultivation, which made stalking an utter impossibility, and that bison and rhinoceros were rarely if ever met with by the inhabitants who were moreover skilled trappers who snared anything they could not shoot, from the smallest bird to the largest animal.

I found this only too true afterwards in many respects although there were still a few bison, goat and rhino left which I straight way made arrangements should not be molested in future by the natives, as these animals seldom if ever molest the people or their crops. My observations and experience has shown me that the only animals which do any appreciable damage to the crops here are pigs, monkeys and sambur and of the birds tribe parrots and rose birds. Elephants are scarce and are never seen amongst the crops, having been hitherto so relentlessly hunted and shot down by the wild tribes living in this and in the unadministered territory, but more especially in the latter place, that they now always inhabit the densest patches of jungle to be found. One or two small herds of 10 or 15 animals have settled down in a large valley known as the "Kun" at the foot of the Kyauk-pan-daung range where they should multiply if not molested, whilst two other small herds may be met with along the banks of the Ru and Lemro streams in the vicinity of the Lower Lemro and Pongwa Police posts. The one desire of the hill people in these parts is to become possessed of a gun and an unlimited supply of ammunition in order not only to supplement their food-supply, but to make a living by the sale of the meat, hide and horns of the animals shot by them. But this no doubt is a very common and reasonable enough desire and applies as well to other races within and outside the Province of Burma. It is not easy nevertheless to know where and when to place restrictions or where to draw the line or to distinguish between the man who desires a weapon solely for the legitimate purpose of protecting his crops and the man who wishes to use it in order to make money easily. It is not possible to expect that a headman or villager who having received a gun from Government for the purpose of protecting himself or his crops will

refrain from wandering away into the jungle miles away from them in search of a meadow, pig, bison or rhinoceros, the tapping of any one of which he knows will bring him to food as well as victory, or of stalking the goat by more skilled hunters than himself for the same purpose.

W. A. THOM.

Peshawar, 11th November 1919.

[The above note by Mr. W. A. Thom was written in 1914 and originally intended for publication in the "Indian Field" but never sent. Recently Mr. Thom came across this note and offered it to us. He has kindly allowed us to make a few alterations in the sentences as brought up-to-date by Mr. Pocock.—Eds.]

No. IX.—NOTES ON THE DOMESTIC YAK OF THE TAGHDUMBASH PAMIR.

(With a plate.)

Of all the domestic animals of the Pamir Plateau, none are more interesting than the Yak known by its owners as the "Khuligar." It is a strong and sturdy creature, with short legs, low gearing, head hanging close to the ground, warmly clad in thick long hair and with a great bushy tail. There are two varieties of the domestic yak, the horned and the hornless, which seem to be completely distinct. From what I could learn, each variety breeds true, the horned always producing horned offspring and the hornless producing hornless offspring, but the problem as to what would be the characters of a calf, resulting from the union between horned and hornless parents, seemed to be far beyond the limited intelligence of a Pamir Kirghiz. Many yaks are subjected to castration at about the age of one year but this has no relationship to the absence of horns. The length of the horns is somewhat variable but the mean of a number of measurements gave an average length of 21 inches. The majority of yaks are of a uniform black colour but there are often to be seen animals of a light brown or fawn tint. Should a yak of a black colour vary in any part towards a different colour, that varying colour is always white, and it may be taken as a rule, to which I saw no exceptions, that if any part of the body is white then the face will also be either partially or completely white. A white face and a white tail, associated with white on the legs, is a very common variety and when a similar band runs along the spine in continuation with the hair in front and the tail behind and accompanied beneath by a white belly, a most frequent and characteristic mode of coloration is then assumed. The brown colour enters into the same combinations with the white as does the black, but, as an exception, was black ever seen associated with brown in the same animal.

The body of the yak is clothed in a thick warm coat of hair or rather in a coat of two different kinds of hair which very greatly in colour and appearance. Superficially is seen the covering of long, thick, straight hairs, hanging vertically downwards over the greater portion of the trunk and, though curled on the lower portion of the limbs, is especially long and shaggy over these upper parts, over the angle of the jaw, the tail, the sides of the abdomen and forming a bushy tuft between the horns and prolonged down from the neck as a thick strong mane. Compared as to the clothing of long hair, it does not appear to be the important means of maintaining the bodily warmth throughout the rigorous winter climate, for interposing it, and in close contact with the skin, is a dense coating of fine hairs closely matted and interwoven together and protecting the whole body in a warm wool-like coverings. The superficial coat may be considered as permanent, so that it does not alter in density according to the season, but the

underlying coat, which in the winter becomes thick and bulky, falls away in the months of March and April, and, in the early summer, can be seen in scattered patches still attached to the animal, especially about the neck and shoulders, separated completely from the skin and capable of being pulled out in large handfuls. The yak is not the sole creature on the Pamirs that throws off its winter garments in such great profusion. The camel, though in winter clad in the thickest and warmest of hairy coverings, in summer becomes entirely naked and from the bodies of even the domesticated dogs I have seen thick layers of wool hanging to their bodies, the remnants of a uniform coating which in winter clothes them. The young yak differs markedly from its parent in the absence of those long hairs which so characterize the latter, and they do not appear to become noticeable in calves until the second or third month. The nomads find both varieties of hair useful for different purposes. With the long hairs they plait ropes and the fine underlying coat they weave into carpets.

It may be of interest to refer to some of the habits of the yak. Like others of the bovine species it delights in standing up to its middle in running water and is often seen wallowing in the icy rivers descending from the snout of a glacier. It climbs thousands of feet up the mountain side in search of fresh grazing grounds and, in spite of its apparent clumsiness, the cleverness and agility it displays in clambering from rock to rock is amazing. It is an extraordinary patient creature and will often remain almost immobile for half an hour at a time. A clever rider can urge this ungainly beast into a steady amble and, on occasions, into a smart gallop; and it is a strange characteristic that so drowsy and sullen a creature will sometimes start at strange objects as foolishly as a skittish horse, while, at other times, it becomes so sleepy as to lie down beneath its rider. The hinder portion of the spine is extremely tender and the rider takes a cruel advantage of this by continually pounding the animal on the tender area with a thick stick. To such an extent is this unfeeling act prolonged that at the end of a long march every yak is suffering from a bleeding and ulcerated back. The yak loves companionship. A herd of the creatures, moving together, will travel at a rapid pace but if one be separated from the remainder of the herd or if a single animal detects others of its kind on a neighbouring hill-side, it will exert all its pertinacity and stubbornness in the endeavour to join them. When a yak becomes determined to travel no further, and this often occurs when it is confronted by a steep hill, it depresses its head almost completely to the ground, strains painfully on the nose rope and, in spite of all human persuasion, both gentle and severe, it obstinately turns round and rushes precipitously down the slope. The yak is in its element in the snow. A herd usually travels in single file and each member will carefully place its feet in the imprints left by the hoofs of the one which preceded it.

An interesting deformity was, on one occasion, observed. From a point in the centre of the face, about three inches above the anterior margins of the nasal apertures, was seen growing forwards a third horn. The horn was about two inches in the vertical diameter and one inch transversely and was oval in shape, with the long axis directed upwards. It was not more than a few inches in length and was truncated owing to the tip being broken off. Its direction was downwards and forwards and the broken end tended to turn upwards. The yak delights in licking the snow and, in the valleys, may sometimes be noticed eating quantities of earth, presumably for the purpose of obtaining the saline ingredients which, in places, cover the ground with a white efflorescence.

The yak, though the beast of burden of the nomads, must be considered as only partially domesticated. It finds its food where and when it

A characteristic type of coloration in Yaks.

Yak Calves.

A Riding-Yak.

can. The production of its young does not occur at irregular intervals and independent of season, but the calves are born in the early Spring, about the month of March. The cold and scarcity of food greatly thin their numbers and one nomad told me that he had lost as many as twenty animals in the preceding Winter. It is dependent not on the care and attention of its owners but on the abundance of food and the clemency of the season. It lives in a continual struggle with the fiercest elements of Nature in the bitter cold of those silent altitudes.

R. W. G. HINGSTON, Capt., I.M.S.

Abbottabad, *February* 1914.

No. X.—INTERESTING BIRDS FROM JHELUM DISTRICT, PUNJAB.

The following birds obtained or noted in Jhelum District during the past year are perhaps of sufficient interest to be placed on record.

1. The Spotted Flycatcher (*Muscicapa grisola*, Linn).—A single male obtained at Sardi (2,900 ft.) in the Salt Range on 10th September 1913. I can find no previous record for the Punjab.

2. The White-throated Fantail-Flycatcher (*Rhipidura albicollis*, Vieill.)—A pair seen in the District Board Garden at Jhelum on 5th November 1913 and a single bird seen in the same place on 13th January 1914.

3. The Dark-grey Bush-Chat (*Oreicola ferrea*, Hodgs.)—Two males were obtained in the District Board Garden at Jhelum on 20th October 1913 and 27th February 1914, respectively.

4. The Red-flanked Bush Robin (*Ianthia rufilata*, Hodgs.)—A single female was obtained in the Government Forest Rak at Jhelum on 2nd January 1914.

5. The Pine Bunting (*Emberiza leucocephala*, S. G. Gm.)—An adult male was obtained from a small flock on the Golf course at Jhelum on 18th February 1914, and a solitary female was obtained at Dumman on 3rd March 1914. In addition to the above I saw a number of birds probably of this species at Dhodha, P. S. Dumman, on 10th April 1913. This appears to be an extension of the known range.

6. The Great Himalayan Barbet (*Megalæma marshallorum*, Swinh.).—A single female was obtained at Jhelum on 1st April 1914. It was moving about in tall trees in my compound and was rather shy.

7. The Smew (*Mergus albellus*, Linn.)—On 12th January 1914, I secured a female out of a small flock that were busily engaged in diving in the Jhelum river, a few miles above Jhelum.

8. The Turkestan Penduline Titmouse (*Anthoscopus coronatus*, Sewerz.)—On 27th March 1914, I met with a small party of three or four birds feeding in a Shisham tree in the Government Rak at Jhelum. I had no gun with me but was able to examine them from a very short distance and so identify them from the grey crown, very broad black eye band extending from the lores to the nape, chestnut mantle, cream white and rufous underparts. I have no doubt whatever but that the birds were correctly identified, and from the previous reported occurrences at Sukkur and Kohat it is not very curious that stragglers should be found at Jhelum.

HUGH WHISTLER, M.B.O.U.,
Indian Police.

Jhelum, *March* 1914.

No. XI.—THE NILGIRI BABBLER (*ALCIPPE PHÆOCEPHALA*) IN THE BASTAR STATE, CENTRAL PROVINCES.

In the *Fauna of British India, Birds*, Vol. I, p. 158, Oates records the distribution of this bird from Khandala to Travancore along the Western Coast of India, also at Pachmarhi in the Central Provinces; further he states that there is an *Alcippe* in the British Museum from Pareshnáth Hill which he is inclined to identify with the present species. It is interesting therefore to note that on January 22nd of this year I secured a specimen of this bird at Parasgaon in the Bastar State.

E. A. D'ABREU, F.Z.S.

THE MUSEUM, NAGPUR, 9*th March* 1914.

No. XII.—THE YELLOW-BREASTED BABBLER (*MIXORNIS RUBRICAPILLUS*) IN THE BASTAR STATE, CENTRAL PROVINCES.

Three specimens of this bird were obtained in January of this year on a collecting trip in the Bastar State at Parasgaon.

I do not think this species has ever been recorded in the Central Provinces or further west, on the plains, than Chota Nagpur, so the record is interesting.

E. A. D'ABREU, F.Z.S.

THE MUSEUM, NAGPUR, 9*th March* 1914.

No. XIII.—AN ABNORMALLY COLOURED SHAMA (*KITTOCINCLA MACRURA*).

On the 14th March I went to Tagundaing, about 1,000 feet elevation in the South Shan foot-hills on the Thazi-Kalaw road. There in the jungle, off the main road, I shot a bird which I did not recognise and being unable to skin it, as I had hoped to do, I wrote a careful description of it, which I append. I think it is of sufficient interest for the journal owing to its resemblance to the Andaman bird and I should like to hear if any other members have met with similar variations in this species. I have classified it as *K. macrura* for the obvious geographical reason, but it is certainly nearer *albiventris*. I should mention that the bird was a female with ovaries in a state of development suggesting that it would shortly have been laying.

Length 7·6 inches, tail 4, wing 3·5, tarsus ·9, bill from gape ·93. Iris dark brown. Eyelids plumbeous. Bill black, base of lower mandible horny brown. Mouth fleshy. Legs and feet fleshy. Claws very pale horn. Head all round, back, scapulars and wing coverts sooty brown. Rump and upper tail coverts white. Tail: middle two pairs blackish; next pair same with a narrow tip to inner web and a broad (one inch) tip to outer web white; next pair same but one inch white on inner and one and a half inches on outer web; next two pairs same but an equal or almost equal amount of white on tips of both webs. Quills dark brown. Chin tinged ashy brown tinged with ashy. Throat and upper breast sooty brown. Lower breast rufous. Abdomen and under tail coverts white. Flanks brown, the feathers edged with rufous. Wing lining whitish mottled with brown.

I much regret not having been able to keep the skin.

F. E. W. VENNING, CAPT., M.B.O.U.

PYAWBWE, 19*th* March 1914.

No. XIV.—THE BREEDING HABITS OF THE BROWN-BACKED INDIAN ROBIN (*THAMNOBIA CAMBAIENSIS*).

I append descriptions of two nests of the Indian Robin which were placed in sites different to any described in Mr. Pitman's note on the nesting of this species at p. 796, Vol. XXI of the Journal. Both nests were found in the stony nullahs by the R. Sohan which is the favourite haunt of the species near Rawal Pindi. In both the Rawal Pindi and Jhelum Districts (and the same peculiarity has been noted at Kohat) the Indian Robin is practically confined to the arid stony hills and nullahs, clothed with coarse grass and scrubby bushes, being but seldom found in gardens and cultivation which seem to be its natural habitat down country.

28*th April* 1911.—C/3 slightly incubated eggs found in a nest built under a large stone balanced on two others: to the front the nest was fairly open, while at the back there was a small hole—almost a short tunnel—used by the female as a "bolt-hole" when the nest was approached from in front. The nest was very flimsy, built of coarse dry grass roots, and lined with fur, horsehair, and portions of snake's slough. Many bits of earthern cocoons were mingled with the foundations, possibly by way of binding the grass.

15*th May* 1911.—C/3 rather incubated eggs from a deep cup composed of grass, roots, etc., and lined with fine roots and horsehair, which was built under a stone behind a tuft of foliage on a steep bank, a few yards from the water's edge.

HUGH WHISTLER, M.B.O.U.,
INDIAN POLICE.

JHELUM, *March* 1914.

No. XV.—THE OCCURRENCE OF THE BANK MYNA (*ACRIDOTHERES GINGINIANUS*) NEAR MADRAS.

On January 14th, an adult male specimen of *A. ginginianus* (the Bank Myna) was captured at Vandalur, a village twenty miles South of Madras, by one of the Museum suppliers. It was found feeding on a field near the village in company with several common Mynas (*A. tristis*). It is now preserved in the Madras Museum.

According to Oates (*Fauna of British India*) this species is not found South of the Nerbudda and Mahanadi rivers, while Jerdon in his '*Birds of India*' asserts "It certainly does not occur in South India, notwithstanding its specific name taken from Gingi, South of Madras."

B. SUNDARA RAJ, M.A.,
ZOOLOGICAL ASSISTANT.

MADRAS GOVT. MUSEUM, *February* 1914.

No. XVI.—A NEW SWIFT FROM BURMA.

THE BURMESE SWIFT (*MICROPUS PACIFICUS COOKI*).

(*With an illustration.*)

Harington, B. B. O. C., XXXI., p. 57 (1912). Ibis 1914, p. 22.

Description.—Similar to *M. pacificus*, Latham, but smaller, the white band across the rump narrower, about 10 mm. wide instead of 15 mm.; only the feathers on the middle of the throat white, with well-marked black shaft stripes, those on the sides of the throat black fringed with white producing a barred appearance; the back and mantle deep glossy black with a metallic sheen.

Wing 170 mm., middle tail-feather 51 mm., lateral tail-feathers 75 mm.

Mr. Tom Iredale, M.B.O.U., has pointed out to me the following interesting differences between this new sub-species and the Large White-rumped Swift from China.

"In the typical *M. p. pacificus*, the wing is very long, with narrow elongate feathers. The second primary noticeably the longest, the first about 8 mm. shorter, whilst the third is about 12 mm. shorter; that is, the first is longer than the third; the fourth about 18 mm. shorter than the third, and the rest correspondingly shorter."

"In the sub-species *M. p. cooki*, the first primary is longest; the wing is shorter, and the feathers broader than in the typical form; the first is 2 mm. longer than the second, which is 10 mm. longer than the third; the third is about 15 mm. longer than the fourth, but the rest do not decrease so quickly as in the previous one."

"The tails also show corresponding differences. In the typical *M. pacificus*, the tail is long and deeply forked, the tail feathers narrower; in *M. p. cooki*, the fork is less deep, while the tail feathers are broader.

M. p. pacificus.—Outer tail feather is 10 mm. longer than second, which is 16 mm. longer than third. Fork of tail 35 mm. deep.

M. p. cooki.—Outer tail feather is 2 mm. longer than second which is 6 mm. longer than third. Fork of tail 24 mm. deep.

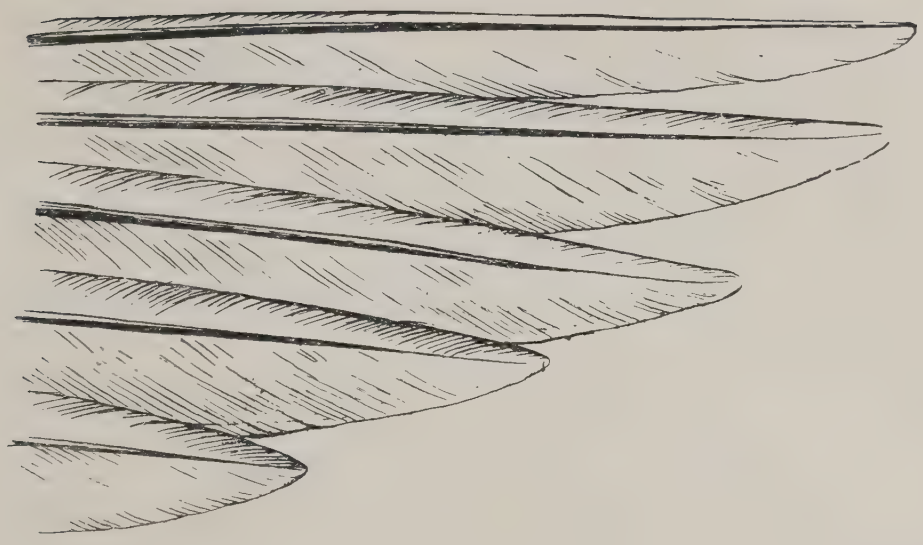
It is a well known fact that migratory birds, which are generally accustomed to cover long distances, generally have long pointed wings, and as soon as they give up the migratory habit, their wings become shorter and broader.

This is very well exemplified in the "Flight of Birds" Series in the Natural History Museum, where the wings of the European House Martin (*H. u. urbica*, L.) and the Algerian House Martin (*H. u. meridionale*, Hartert) are displayed. The former being a highly migratory species, summering in Northern Europe and migrating for the winter to Africa, whilst the latter is a resident species, spending the whole year in North Africa. These differences closely correspond with those of the two Swifts. *M. p. pacificus*, breeds in Siberia and North China and migrates to Australia, and has consequently a long pointed wing, whilst *M. p. cooki* is in all probability strictly resident, or only leaves its breeding haunts for a very short time, and has therefore developed a shorter and broader wing.

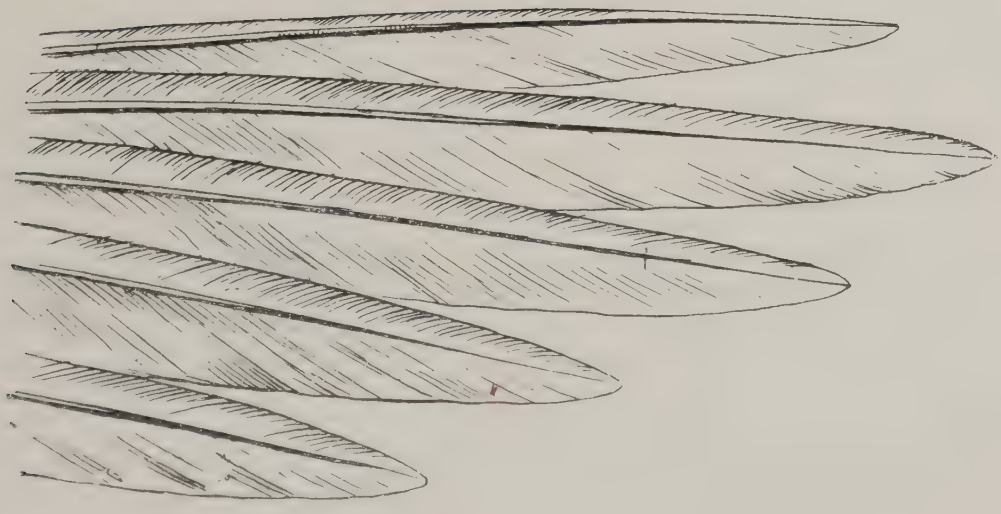
I first noticed the Burmese Swift in the Goteik Gorge in February, when they were flying about near the railway bridge in thousands. In June I paid a visit to the famous caves, where I found them breeding. Mr. J. P. Cook informs me that he found them inhabiting some caves about 30 miles north of the Goteik Gorge, in Yatsauk State; where they were literally in thousands, this was in October, they can therefore only leave their breeding haunts at the most for two or three months, and in all probability do not leave at all. This point can easily be settled if members of the Society at Maymyo or in the Northern Shan States would report whether the Swifts are seen in the Gorge in the months of November, December and January.

Distribution.—Probably throughout the Shan Plateau. and breeding in the numerous lime-stone caves which are found throughout that region. There are the following specimens in the British Museum, besides those collected by Mr. Cook and myself:—1 specimen collected by J. Davison 5. 7. 74. at Amherst and 1 specimen collected by Thompson 7.1.01. at Maukmai.

Nesting.—In June I found the Burmese Swift breeding in thousands in the Goteik caves, which form a natural bridge through which the river flows, and over which is constructed the railway viaduct (which is said to be the



M. p. cooki. (nat. size).



M. p. pacificus. (nat. size).

highest bridge in the world). All the nests were inaccessible without the aid of ladders, being built against the roof or sides of the caves overhanging the river. Although so well protected from enemys from below, they appear to be victimised by bats, which simply swarm in the caves, making their presence known by their noise and stench, as I picked up a number of eggs which had clearly been sucked. I also picked up a fully fledged young bird, and a nest. This was saucer-shaped and composed of leaves and grasses, and lined with a few feathers, the whole being cemented together with saliva. I have been told that they also breed in the railway tunnels on the far side of the Gorge. The eggs I picked up were a glossless white, and in shape very long elongated ovals, and measured 1·0 × ·67 inches.

I was informed in Maymyo in 1912, that early in the year a large number of Swifts appeared and haunted one of the bridges in the B. I. Lines, and then suddenly disappeared again. Whether they belonged to this species, or were the Malayan House-Swifts (*M. subfurcatus*) I could not discover.

I hope that members stationed at Maymyo, will report if these Swifts appear again,—and also whether *M. p. cooki* is found in the Goteik during the winter months. I should also be extremely grateful for any eggs, which I was unable to procure myself.

London, *January* 1914.

H. H. HARINGTON, Maj.

No. XVII.—NOTES ON DOVES IN THE PUNJAB.

A perusal of "Indian Pigeons and Doves" shews that there is apparently but little on record with regard to the Punjab, so the following remarks may be of interest. No mention is made of the migratory habits of the Red Turtle-Dove (*Œnopopelia t. tranquebarica*) which in the northern Punjab at least are very pronounced; for it is a summer visitor arriving in considerable numbers for the purpose of breeding. To judge by my own observations (which I should be very glad to have either refuted or strengthened), the movement north must be a very leisurely one, there being a slight corresponding difference in the dates of commencement of nidification between in the north and south portions of the Punjab.

In Ferozepore District (1912) I noticed the first bird on 25th February, and at Phillaur (1910) I found the first nest with eggs on April 9th, but failed to note how much earlier the species had arrived. Here in Jhelum district this year the first bird was heard on 20th March and they were numerous before the end of the month. Whereas in Rawal Pindi district (1911) I first noticed them on April 23rd on which date they were numerous, and at least a few must have arrived a little earlier as I found two partly incubated eggs in a nest on May 4th. Capt. Whitehead records the species as a summer visitor at Kohat from the second week of April until August.

The return movement in Jhelum takes place about August; practically all the birds have gone by the end of the month, the last bird noted being seen on 2nd September.

In this connection it would be interesting to learn on what date Mr. Pitman saw the large flocks of males in Chanda district, C. P. as the fact may have had some connection with this annual migration.

The usual note is a long sustained purring coo—very distinctive in character. Another highly migratory species in these parts is the Indian Turtle-Dove *Streptopelia turtur ferrago*, which breeds commonly in the Murree and Hazara hills occurring in the neighbouring plains districts on migration.

In Rawal Pindi District (1911) I found these handsome Doves extremely numerous in the wooded portions of the Topi Park from the middle of April up till the middle of May, when I left for the Hills. They were noticeably shyer than the other species of doves and but seldom found out of the denser woods. In 1912 they were there on the 5th May when I passed through. I have not been in Rawal Pindi during the autumn migrations, but they doubtless pass through in October, as at Nathia Gali last year I found them in flocks preparing to depart during the last half of September and a few occurred at Jhelum during the last week of October. A few occur at Jhelum on the spring migration also. As for their status in the rest of Punjab—save for Kohat where they are similarly spring and autumn migrants—I can obtain no information; any notes on the subject would be welcome.

In the Punjab—apart from the hill districts like Kangra and part of Rawal Pindi—the Spotted Dove (*Streptopelia s. suratensis*) is apparently rare or a seasonal migrant only, for the only part where I have met it is Jhelum: here on four occasions only, from November to March, I have met with a pair and three odd birds, probably stragglers from the Jammu Hills.

With regard to the Eastern Stockdove (*Columba a. eversmanni*) it would seem to be in the Punjab a spring and autumn passage migrant rather than a winter visitor, but more evidence is greatly to be desired: personally I have only met it at Phillaur towards the end of April, and near Fazilka, Ferozepore district, about the middle of October; on both occasions it occurred in large flocks. Hansi in March and Kohat in the latter half of April are the only dated records which I can find.

With regard to the Green Pigeons in the Punjab, the published material is very scanty: any evidence as to species obtained with dates and localities would be very welcome to enable one to work out their distribution in these parts: in many districts they would seem to be entirely absent.

I should be very grateful to anyone who would either corroborate or disprove the correctness of any of the above remarks on the distribution of our Punjab Pigeons and Doves.

H. WHISTLER, M.B.O.U.,
Indian Police.

JHELUM, *March* 1914.

No. XVIII.—DOVES IN BOMBAY.

In his "*Indian Pigeons and Doves*" Mr. Stuart Baker, writing of the distribution of the Spotted Dove *Streptopelia s. suratensis* says "Both "Eha" and Dewar state that this dove is never found on the Island of Bombay, though both the little Brown and the Ring-dove swarm." As this hardly agrees with my experience I have thought it worthwhile to give the quotations referred to from the works of "Eha" and Dewar.

"Eha" writes of the Spotted Dove: "On the mainland and islands just across our harbour it is very plentiful, but I have never seen it in Bombay. The doves I have met with about Cumballa and Malabar Hills all belong to the species so common in Poona" (*i.e.*, *risorius* and *cambayensis*). Dewar says: "It is the commonest dove of Calcutta, of Madras, of Travancore, of Tirhoot, of Lucknow but not Lahore or Bombay or the Deccan."

Either the birds have changed or "Eha" made a mistake, but certainly *Streptopelia s. suratensis* is found in Bombay now. Mr. Comber in his List of Birds in the Bombay City Gazetteer gives this species and the little Brown Dove, not mentioning the Ring-Dove in Bombay. On the southern end of the adjoining Island of Salsette all three species are very common.

N. B. KINNEAR.

BOMBAY, *April* 1914.

No. XIX.—THE SNOW PIGEON (*COLUMBA LEUCONOTA*) AT A LOW ELEVATION.

I saw in February 1913 at Rajpur, Dehra Dun, a flight of 30 birds, elevation 2,200'. There was at the time a heavy storm going on in the hills.

When staying at Lambatch bungalow (about 7,500') I saw often as many as 50 or 60 of these pigeons on a patch of scrub 20 yards square. The birds were feeding on the berries of the Bekhla, and many of them were taking the berries while hovering over the thin branches which were not strong enough for their weight. The places where the birds usually fed were about 6,000' to 6,500'. The birds are known locally as Bekhla, the same name as the plant.

The forest thereabouts is closed and is leased from the Raja of Tehri and consists mostly of Kail (*Pinus excelsa*).

Though I offered rewards and also had two orderlies out I was unable to obtain any nests.

H. F. FULTON, Major.

Dehra Dun, *March* 1914.

[Mr. J. Donald writes us that this shrub is probably *Prinsepia utilis* called in Jaunsar 'Bhekoli' or 'Bhek' or in Tehri-Garhwal 'Bhekal' or 'Bhekar'.—Eds.]

No. XX.—IMPERIAL SANDGROUSE (*PTEROCLES ARENARIUS*) IN CHITRAL.

I am sending you the enclosed skin of a bird which I shot here on the 15th March out of a party of three. I also put up a single bird on the 14th. It appears to me to be that of an Imperial Sandgrouse, and I would like to know if this bird has been recorded from Chitral. The Chitrali has no name for it and apparently does not know it.

For the last five or six days there has been a strong north wind blowing, but the weather on the whole has been good for the last two weeks.

H. D. STIRLING, Captain.

Chitral, *16th March* 1914.

[The skin sent is that of an Imperial Sandgrouse, and as far as we know it has not been recorded from Chitral before. It has however been obtained by Colonel Bainbrigge in Gilgit and Major Stone in Kashmir and breeds in Afghanistan, so its occurrence in Chitral was to be expected.—Eds.]

No. XXI.—NOTE ON THE HABITS OF THE KALIJ PHEASANT.

It may be of interest to note that on 6th ultimo I came across a cock Kalij pheasant (*G. horsfieldi*) looking after a flock of young a few days old. I saw no sign of the hen, though I watched the cock for several minutes. Probably she was absent looking for food. The cock was very aggressive and ran around demonstrating, often coming within ten yards of me. The chicks were hiding in the leaves, one within a few inches of my feet.

H. W. A. WATSON.

Mogok, Burma, *6th April* 1914.

No. XXII.—BEWICK'S SWAN SHOT NEAR QUETTA.

I have to report that a female Bewick's Swan (*Cygnus bewicki*) was shot by Mr. A. Aitken at Khushdil Khan, about 40 miles from Quetta, on 17th December 1913. I think there can be little doubt about its identification.

but I append its measurements as taken in the flesh and a painting of its head taken from the specimen by myself. The bird is now mounted in the Quetta Museum.

Bewick's Swan (*C. bewicki*).			Whooper (*C. musicus.*)		
	Quetta Swan. ♀	Measurements of according to Dresser's "Birds of Europe." Female described as smaller.	Dresser Female smaller.	Baker Indian Ducks.	Blanford F.B.I. Female smaller.
Length	44	46	60	52	60
Height	14	....	..	16·5	..
Wing	19¾	18·7	23·2	23·5	25
Tarsus	4	3·85	4·3	4	4·5
Culmen	3⅞	....	..	4·5	..
Bill from gape ..	3·4	3·4	3·95	..	4
Expanse ..	74	....	..	85	..

R. MEINERTZHAGEN, Capt.,
Royal Fusiliers.

Staff College, Quetta, 26*th March* 1914.

[Unfortunately we are unable to produce Capt. Meinertzhagen's beautiful sketch.—Eds.]

No. XXIII.—BRONZE-CAPPED TEAL (*EUNETTA FALCATA*) AT ROORKEE.

It may interest you to hear that I killed two Bronze-capped Teal (*Eunetta falcata*), male and female, here on the 12th February. They were flying with other duck, chiefly wigeon and pintail, and I shot them without knowing what they were till I picked them up.

R. G. BIGNELL, Lieut.

R. A. Mess, Roorkee, 14*th February* 1914.

No. XXIV.—LATE STAY OF SNIPE.

With reference to the late stay of snipe in the Central Provinces noted on by Mr. C. R. Pitman in Volume XXII, No. 3, page 632, in this Province I have often wondered how it is that a certain number of snipe are to be met with every year, very often in most unlikely spots far late in the season. Here one is not surprised to see odd snipe on the banks of the Irrawaddy above Myitkyina late in April as it gives the impression of stray birds returning leisurely to their breeding haunts, but in both Lower and Upper Burma I have time and again seen odd birds as late as the middle of May.

The usual snipe season in Lower Burma is from say 20th August till end of October or early November in favourable rainy seasons; in others when the rains cease rather abruptly they start for Upper Burma towards the end of October. Still a number of snipe do remain behind, *e.g.*, twenty-five couple were shot by two guns two days ago, 21st February, though as stated above, the season in Rangoon was over nearly four months ago. I have shot as many as 15 couple at the end of March in Lower Burma. In Upper Burma the season is from November till end of February but in one or two places in Kyaukse District I have seen enough snipe on flooded fields at the end of April to afford a good days shooting. I have shot two woodcock in March, one in Upper Burma, the other in the Northern Shan States.

G. H. EVANS, Colonel.

Rangoon, 25*th February* 1914.

No. XXV.—WHITE SNIPE.

During twenty-five years' residence in Burma I have seen five so-called white snipe. Some years ago I shot one in the Sagain District, and sent the skin to the Society's Museum. Since then I have shot two others, one in the Shwebo and the other in the Kyaukse District. A fourth bird I saw was, if I remember rightly, shot by Colonel Eyre of the Commission near Sagaing. Until quite recently I never heard of one being seen in Lower Burma. Mr. W. Perry brought me a specimen one evening which he had shot within a few miles of Rangoon. He gave me the bird which I took home, giving my servant instructions to put it in the ice box as I wanted to skin it in the morning. Being a good servant he thought he would save Master trouble so undertook the job himself. When I called for the snipe he produced it wrapped in paper and with his face wreathed in smiles, announcing that he had 'done finish skin.' My attempts at taxidermy are nothing to be proud of, but his proved to be decidedly worse. Mr. G. C. Shortridge, however, thought it was good enough to keep so took it away.

A white snipe getting up suddenly rather startles one, as the difference in colour is instantly appreciable. The first one I saw I straight away missed: however, I marked him down, followed up and did better next shot. Mr. Perry was so much surprised when his bird rose, he did not fire, but his curiosity being aroused he marked the bird and later secured him. There is nothing noticeable as regards flight. All the specimens I have seen to the best of my recollection have been fantails. I do not consider the change in colouration adds to their beauty. The general appearance conveys the impression that serious attempts had been made to wash out ordinary markings.

Are such birds occasionally shot in India?

G. H. EVANS, Colonel.

Rangoon, 25*th February* 1914.

[The Society has received from time to time a number of these semi-albino and albino fantail and pintail snipe from different parts of India including one jack snipe.—Eds.]

No. XXVI.—EGRET FARMING IN SIND.

(*With a plate.*)

In connection with the "Plumage Question" at present so much to the fore it will perhaps cause no little surprise to many to hear that the little Egret (*Herodias garzetta*) is now being bred and reared with marked success in captivity and on an extensive scale in many parts of Sind and that the

Mirbahars (the generic term by which the fisher-folk of the inland waters of the Province are known) are building up a lucrative trade in osprey feather plucked from the plumage of these egrets and that the operation is conducted without injuring the birds, in the same way as feathers are plucked from the ostrich.

During the course of residence on duty at the village of Ber in the Kamber Taluka of the Larkana District the writer spent some considerable time in investigating personally the *modus operandi* of the breeders and has thought it worthwhile to record the results of his investigations as the egret or white heron is regarded popularly as requiring most protection by the State against the depredations of man in pursuit of the beautiful osprey plumes, now so valuable a commodity in the world of fashion.

The village of Ber is situated on the edge of the Chango Lake or dhand in the Larkana District.

At a distance of about three hundred yards from the village and practically on the edge of the water, a colony of Mirbahars numbering some 200 men, women and children have their abode in reed huts. A feature which attracted the writer's attention, since his last visit to the village, was the recent erection in front of each abode of quadrangular structures of reed mats some 20′. 8′. 8′ resembling an ordinary poultry run. On obtaining entrance into one of these structures he found it contained at least three score pairs of full grown egrets in a state of freedom: there was a plentiful supply of perches for the birds, and the cage was tolerably clean. The birds appeared to associate in pairs, and met the intrusion with their usual hoarse cries. A liberal supply of food, consisting of small fresh water fish netted in the dhand, lay about in shallow earthern platters and the birds helped themselves to this at pleasure. The birds were fairly tame and allowed themselves to be seized by their owners without showing any fear. There were about twenty such cages in the village each containing about fifty birds on the average.

There was ample evidence to indicate that the birds breed freely in these conditions of modified captivity. Enquiries showed that under these conditions birds assume their nuptial plumage four times a year: twice in summer and twice in winter; the summer plumage is comparatively poor, nearly half that of the winter plumage.

The breeding season commences early in March and continues up to the end of September. As soon as the breeding season begins the birds break up into couples: twigs are strewn about the cage and each pair of birds build a nest. The birds hatch their own eggs which are jealously guarded, the male bird invariably taking the place of the mother bird when she leaves the nest for food or exercise. The young are permitted to remain with the parent birds for about a week when they are removed and reared by hand: the couple meanwhile commence to breed again.

The number of times the birds breed during this period depends on the degree of vitality of each pair; eggs are laid never less than twice during the season and sometimes as many as four or five times; the number of eggs each time varies from three to five. It takes about 12 months for a bird to reach maturity.

The plumes are made up into small brushes weighing about half a tola to a tola, and are taken to Sukkur and Karachi for sale. The prices realized range from 10 to Rs. 15 a tola: as each bird yields plumes seldom less than a tola in weight and often more during the year, it will be understood how lucrative a hobby egret-farming has become. The Sukkur merchants export the feathers to Calcutta whence they are no doubt smuggled out of the country to the European markets where prices ranging as high as £ 15 an ounce of feathers are realized.

A. Egret fledglings, 2 weeks' old.

B. Inside view of Egret colony shewing brooding birds.

C. Interior view of enclosure shewing nests and birds.

EGRET FARMING IN SIND.

Not only has a trade in the plumes been built up but the birds themselves now command a high market value; young birds three to four months old are sold at 10 to 12 per Rs. 100, full grown birds command as much as Rs. 100 per pair.

The ease with which the egrets are bred and multiply, the fruitful crop of plumes yielded by the bird and the high prices which the birds command are causing the industry to spread very rapidly in the neighbourhood of the inland waters of the Province of Sind and it may be predicted with safety that in a few years, if the demand for the plumes continues, every fishing village in the interior of the country will have its egret farm. Of course the trade in plumes of the birds of the egret and heron species has always existed in Sind but the methods formerly followed were quite different and the trade never attained such large dimensions. The practice followed till about three decades ago, was to snare the birds and destroy them for their plumage. On this being stopped, by executive orders of the then Commissioner in Sind Mr. (now Sir) Evan James, the practice of snaring the birds and keeping them in captivity was resorted to; but this led to the infamous custom of stitching up the birds' eyes with the object of preventing them from escaping. The latter practice is now rigorously suppressed by action under the Prevention of Cruelty to Animals Act and these orders have proved an important factor in the inception of the system of egret farming described in this note.

Arrangements are being made to obtain a pair of the birds for the Karachi Zoo.

In this connection a question bound to arise sooner or later is the necessity for the modification of the drastic Notification issued by the Government of India in 1902 which "prohibits the taking by sea or by land out of British India of skins and feathers of *all* birds other than domestic birds, except (*a*) feathers of ostriches and (*b*) skins and feathers exported *bona fide* as specimens illustrative of natural history."

The result of the Notification has been to create a large industry in the smuggling out of the country even in cases where destruction and cruelty to the birds concerned are not involved, of feathers that have a distinct commercial value: if bird-farming on humane lines for the sake of plumage is to be encouraged in India, these orders must be modified. Only the other day the Customs authorities at Karachi seized several boxes of peacock feathers which were being surreptitiously exported under a false declaration by a European Firm. These were confiscated and a fine imposed. Now it is well known that the peacock moults its train. The bird is regarded as sacred by a large majority of Indians and is seldom or never killed by them and the occasions on which it is shot by inexperienced European sportsmen have not infrequently led to collisions with the country people. In many other directions the necessity for the amendment of the orders in question could be indicated, so as to encourage instead of deterring the farming of birds whose plumage has a distinct marketable value.

GEORGE BIRCH,

KARACHI, *March 23rd*, 1914. Assistant Commissioner in Sind.

[Mr. Birch has sent us some specimens of the plumes and also some photographs of the Egrets in the 'farms', some of which are reproduced here.—EDS.]

No. XXVII.—A CURIOUS HABIT OF KITES AND CROWS.

Residents in Rangoon have a choice of two Golf Courses, one in Cantonments, the other situated at Mingaladôn some twelve miles out. On the

former course I have not heard of crows being a nuisance to players. In a large city no doubt there is no lack of other means by which they can annoy people. Near the fifth hole there is a large tree (*Ficus religiosa*) and within 50 yards a barrack. From October till the rains begin, quite a number of the common variety of Kite take up their residence, roosting on the tree and on the ridge of the barrack roof. On several occasions a kite hovering about has on seeing a ball played on to or near the green swooped down and removed it. It is invariably a new or very clean ball that attracts attention. On the Mingaladôn course there are one or two Mango topes in the vicinity of some of the holes, and in these some jungle crows reside. One or more of these crows earned notoriety by making a business of watching players and when a ball was played, out flew a crow to where the ball landed, and if it met with his approval promptly carried it off. A crack player was annoyed at losing a hole apart from the loss of a ball, while an indifferent or bad player who with ease can lose a few balls on a round was furious to find that when he made a shot on which he could congratulate himself this wretch of a crow stole out and removed the ball. One crow in particular was blamed; how he was recognized as the culprit history does not relate, but the fact remains that at the time I speak of some 17 new balls had been taken. The rumour got about that the Honorary Secretary had a trained crow for the purpose of keeping him supplied with balls, and I fear he was submitted to a good deal of chaff and wished the golf course crow elsewhere.

One day we took a Collector's gun (·410) doubled up, while doing a round. In due course two crows became very attentive but may have been suspicious; however, a hole or two further on one became more interested and confidential and just when he was not thinking, he was bowled over. I understand the nuisance abated forthwith but I believe another crow has taken a ball or two since. One reads of queer collections sometimes discovered in crows nests, etc., it is rather a puzzle to think what could be done with such a number of golf balls. The removal of one would teach a crow it was useless for gastronomic purposes.

G. H. EVANS, Colonel.

Rangoon, 25th *February* 1914.

No. XXVIII.—*SIMOTES SPLENDIDUS* Gunth, IN BURMA.

In Volume XVIII of this Journal on pages 781-782, Major Wall summarises the records of this rare snake. I have to-day (14th February) received a Valentine in the shape of a fifth specimen, which is further a gravid female. The snake was brought to me this morning with a broken back by two small boys, who stated that they had just found it on the open turf between the armourer's shop and my house here at Pyawbwe. It was still moving slightly when they brought it in. The spot where it was taken is quite open short turf with a somewhat sandy soil overlying at a depth of about a foot, very stiff clay. There is no cover in the shape of bushes or long grass nearer than about 100 yards, but there are some open holes of an old "whiteants'" nest. It is probable, therefore, that it had been travelling by night and had reached the point where it was found, when daylight came and revealed it, though it may, of course, have emerged from the holes referred to.

The following notes on the specimen may be useful. Length 28¼ inches of which the tail is 3 inches. Costals in 21 rows anteriorly and at midbody, and 17 rows posteriorly. The steps occur first about ⅓ of the distance

from midbody and secondly about $\frac{2}{3}$ of the distance by the union of the 4th and 5th rows on the right and of the 5th and 6th rows on the left in both cases. There are 180 ventral shields, an undivided anal shield and 35 pairs of subcaudal ones. The most remarkable thing about the snake's appearance is the enlargement of the rostral shield, not only in its prolongation over the upper surface of the snout, but in its thickness and the way it appears to have been added after the rest of the snake was finished. It touches 8 other shields of which 4 are the curious internasals. The two median ones of these are very small, posteriorly angulate, and project backwards between the two præfrontal shields so as nearly to separate them. The other pair of internasals lie one on either side of the head, scarcely extending to the upper surface and are in contact with the rostral, both the nasals, the præfrontal and the median internasals. The single pair of præfrontal shields (note the aberrant case from Sagaing recorded by Wall and Evans) extend well over the sides of the head, where they meet the outer internasals, the posterior nasals, loreal, upper præocular, and on the upper surface the supraocular frontal and median internasals. The frontal exceeds its distance from the end of the snout and is equal in length with the parietals, which are broad and extend well over the sides of the head. The supraocular is large, but not so large as the frontal.

The horizontal diameter of the eye equals the distance from the anterior edge of the nostril, which is pierced in a somewhat downward direction between the juxtaposed nasals at the top of their suture. There is a single loreal almost rectangular and slightly deeper than long. There are also two præoculars, the lower (the subocular of Boulenger) being a small scale fitted into the angle of the 3rd and 4th supralabials, also two subequal postoculars followed by two temporal shields. The supralabials are eight, of which the 4th and 5th border the orbit and the 7th is the largest. Four infralabials touch the anterior sublinguals, and the 4th and 5th the posterior, which are rather more than half the length of the anterior ones.

The colour is creamy above: there are 13 large irregular blotches of brown with black edges on the body. The first of these is divided by a creamy vertebral line except anteriorly where the dark marking narrows, unites and runs forward on to the head as far as the frontal shield. The last of these blotches is exactly over the vent. The next one before it and the third one before it are only about half the size of the others, and are completely divided by the creamy vertebral line, which makes a deep impression in both anterior and posterior borders of all the rest. From the last blotch on the body a pair of black lines run back on either side of the vertebral line to the tip of the tail, and in four places these are distinctly thickened outwards making four more dark patches, of which the last is on the tip of the tail. Over the rest of the upper surface of the head, extending on to the labials but not covering them and between the blotches on the body and tail, except in the vertebral region there is a thick speckling of dusky brown. On either side beneath is a row of small brown spots, which begins some distance behind the head and does not reach the vent. The remainder of the lower surface, including the labial margins, is white, the rostral alone being speckled with brown.

The specimen contains six large ova, the largest of which measures 1·38 inches by 0·33 inch. The foremost of these reposes on the left side of the body with its anterior end opposite the 115th ventral shield from the head. The next is on the right overlapping the first. The remainder are disposed diagonally overlapping each other, their anterior ends being on the left and their posterior on the right. They are soft skinned, and their contents of a thick cream-like consistency showing no signs of development as far as can be seen without dissection. In one case only 1

noticed a circular, nucleus-like body which perhaps shows that segmentation has begun. My examination was, however, hurried and I have not examined the teeth. The mouth, when the specimen was brought in, was full of earth as if the snake's head had been held down very hard on the ground while it struggled. This is the second specimen from this district.

F. E. W. VENNING, Capt.

Pyawbwe, Yamethin District,
18*th February* 1914.

No. XXIX.—OCCURRENCE OF CANTOR'S WATERSNAKE (*CANTORIA VIOLACEA*) IN THE ANDAMANS.

I have lately received a small adult specimen of this rare snake from the Andamans. The two specimens in the Indian Museum are from Amherst (Tenasserim) and Singapore. Two specimens are in the British Museum, one collected by Evans and me in Wakema (Lower Burma). The habitat of the second is not known. Theobald mentions one from the mouth of the Moulmein River. These are the only records I am aware of. Up to this it has not been recorded from the Andamans.

My specimen has 241 ventrals and 69 subcaudals, and is quite typical. There are 59 black bands on the body, and 18 on the tail. The maxilla has 11 teeth, the last 2 twice the length of the preceding, grooved anteriorly, and obliquely set. No gap separates these large fang-like teeth from the preceding. Palatine teeth 6. Pterygoid 14 to 15″. Mandibular 15.

F. WALL, C.M.Z.S., F.L.S.,
Major, I.M.S.

Almora, 25*th April* 1914.

No. XXX.—A NEW SNAKE OF THE GENUS *TROPIDONOTUS* FROM THE EASTERN HIMALAYAS.

TROPIDONOTUS FIRTHI, spec. nov.

In 1907 in the records of the Indian Museum (Vol. I, p. 156), I remarked upon two specimens of *Tropidonotus* from Nepal, submitted to me by Dr. Annandale for identification. These I referred to the species *chrysargus*, noting differences which I considered at the time insufficient for the basis of a species apart.

Last year Major Firth sent me a single specimen of a *Tropidonotus* from Takdah in the Eastern Himalayas (circa 4,500 feet), which I also at first took to be an aberrant specimen of *chrysargus*. On preparing the skull I found the dentition widely different from that of *chrysargus*, and noted that the lepidosis agreed with the two Nepal specimens previously referred to. Lately I have had a chance of re-examining the two Nepal specimens and find the dentition agrees with the Takdah specimens. I propose to name the species after Major Firth, 2/10 Gurkhas.

Description.—Rostral.—Touch 6 shields, the rostro-nasal greater than the rostro-internasal sutures. *Internasals.*—Two, the suture between them two-thirds that between the præfrontal fellows; two-thirds the inter-naso-præfrontal sutures. *Præfrontals.*—Two, the sutures between them sub-equal to the præfronto-frontal. *Frontal.*—Touches 6 shields, the fronto-supraocular sutures twice the fronto-parietal. *Supraoculars.*—Length sub-equal to frontal, breadth half to three-fourth frontal. *Nasals.*—Divided, in

contact with 1st or 1st and 2 labials. *Loreal.*—One-half the length of the nasals. *Praocular.*—One. *Postoculars.*—Three. *Temporals.*—One or two anteriorly. *Supralabials* 8, the 3rd, 4th and 5th touching the eye. *Posterior sublinguals* longer than interior, in contact with the 5th, 6th and 7th infralabials. *Costals.*—Two headslengths, behind head 19, midbody 19, two headslengths before vent 17. In the reduction from 19 to 17 the 4th row is absorbed into the 3rd or 5th keels present, in all rows posteriorly. *Ventrals.*—173 to 199. *Anal.*—Divided. *Subcaudals.*—80 to 88 divided.

Colour.—Olive-brown or olive-green dorsally with 6 series of indistinct pale roundish spots arranged quincuncially, the median most indistinct. Head dark olive green, or brown above. A white moustache on the upper lip to behind the gape where it may or may not meet a whitish lateral nuchal streak. A small round pale spot on each parietal near the middle, and close to the inter-parietal suture. Chin heavily powdered with black. Belly yellowish (whitish ?) heavily powdered laterally, the powdering increasing towards the median line posteriorly.

The differences between *chrysargus* and *firthi* are as follows, but as it is extremely probable that specimens of both are included under the former name by Mr. Boulenger in his Catalogue, I give the characters present in 12 specimens of *chrysargus* in the Indian Museum—all from Tenasserim—including the skull of a Tenasserim specimen in my collection :—

	Ventrals.	Subcaudals.	Labials.	Labials touching eye.	Maxillary teeth.	Palatine teeth.	Pterygoid teeth.	Mandibular teeth.
firthi	173-199	80-88	8	345	†18-19	12?-13?	19?-21?	21 ?
chrysargus ..	156-166	91-102	*9	*456	†35-37	20 ?-23	38	38-40

* 10 Labials, the 5th, 6th and 7th touching the eye in one specimen on the left side.

† In both species there is a gap at the back of the maxilla followed by two enlarged teeth.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, *25th April* 1914.

No. XXXI.—A NEW SNAKE FROM BALUCHISTAN.
DIPSADOMORPHUS JOLLYI.

Our Society has lately received through Captain Jolly, I.M.S., from Kacha Thana, Baluchistan, among other snakes, a single specimen of the genus *Dipsadomorphus* that deserves recognition as a species new to science. Though the head is rather badly damaged, the lepidosis on both sides is open to accurate observation. I propose to associate it with the name of its discoverer.

Description.—Rostral.—Touches 6 shields; the rostro-nasal and rostro-internasal sutures subequal. *Internasals.*—A pair; the suture between them about $\frac{1}{2}$ to $\frac{3}{4}$ that between the præfrontal fellows, and about $\frac{3}{4}$ the

internaso-præfrontal sutures. *Præfrontals.*—A pair ; the suture between them greater than the præfronto-frontal. *Frontal.*—Touches 8 shields ; the fronto-supraocular sutures subequal to the fronto-parietals. *Nasals.*—Divided ; in contact with the 1st and 2nd supralabials. *Loreal.*—One, touching the eye beneath the præocular.

Præocular.—One, just touching the frontal. *Postoculars.*—Two. *Temporals.*—Small and scale-like. *Supralabials.*—8, the 3rd, 4th and 5th touching the eye. *Infralabials.*—6 ; the 5th and 6th touching the posterior sublinguals. *Sublinguals.*—Two pairs. *Costals.*—Two headslengths from the head 25, in midbody 25, two headslengths before the vent 17. The vertebrals feebly enlarged, the breadth less than the length. *Ventrals.*—268. *Anal.*—Entire. *Subcaudals.*—7. The tail is mostly missing.

Length about $22\frac{1}{2}$ inches, the stump of the tail $2\frac{5}{8}$ inches.

Colour.—Dirty buff with the following very distinct, but ill-defined, blackish marks dorsally. A series of short crossbars down the back involving about 4 scales in the length of the snake anteriorly, 3 posteriorly, and separated by intervals about one scale long (often parts of two scales). Two series of costal spots alternating with one another, and the upper alternating with the vertebral bars.

Head greyish with no postocular, occipital, or nuchal marks. Belly uniform blackish.

The anterior palatine teeth are enlarged but not very markedly so.

It seems to resemble *D. cynodon* in its lepidosis more closely than the other previously described species, but is very distinct in having the vertebrals feebly enlarged, and the loreal in contact with the eye.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, *3rd January* 1914.

No. XXXII.—REMARKS TO SHOW THAT THE SNAKE HITHERTO KNOWN AS *ZAMENIS MUCOSUS* HAS BEEN MISPLACED, AND SHOULD BE INCLUDED IN THE GENUS *ZAOCYS*.

In my popular paper on the Dhaman (*Zamenis mucosus*) in this Journal (Vol. XVII, p. 271), I remarked on a peculiarity in the absorption of the scale rows. On examining a specimen of this snake, we find that just behind the middle of the body (very rarely before) the scale rows which up to this point number 17, reduce to 16 by the absorption of the vertebral row into the uppermost row on the left side. Later the rows further reduce to 14 or 12, by the absorption of the 3rd row above the ventrals on each side. In no other snake with which I am acquainted in Asia from Persia to Japan is a similar peculiarity to be seen. The scale rows in all other species except those of the Genus *Zaocys* being in odd rows in the whole bodylength, whether the rows reduce in number or not. In the Genus *Zaocys* however, the rows are in even numbers. The Genus is a small one which comprised but six species when Mr. Boulenger's Catalogue appeared (Vol. I) in 1893. I have had opportunities of examining, but three of those six species, *viz.*, *Z. dhumnades* from China, *Z. nigromarginatus* from Assam and *Z. tenasserimansis* from Tenasserim. In all these species I find the vertebral row is absorbed into the uppermost row on the left side shortly behind the parietal shields, and from this point the rows are in even numbers. In other words the same remarkable absorption occurs that we see in *Zamenis mucosus* only it is in the neck instead of about midbody. In the three *Zaocys* referred to the scale rows further reduce to 14 by an absorption of the 3rd row above the ventrals.

Anyone familiar with *Zamenis mucosus* in India, a very common snake, would mistake the Chinese *Z. dhumnades* for it, as I did myself. The similarity in the two species in growth, bodily conformation, relative length of tail to body, in every scale peculiarity, as well as in colour and markings is very striking. Only careful attention to lepidosis would show the distinction between the two.

A reference to Mr. Boulenger's Catalogue (Vol. I, pp. 374 and 379) shows that there is an extremely close agreement in the characters of the genera *Zamenis* and *Zaocys*, in fact, the one point of difference one can discover is that the maxillary teeth in the former vary from 12 to 20, whereas in the latter they range from 20 to 33. Now I have six skulls of *Zamenis mucosus* in my collection and find that the maxillary teeth number from 20 to 24, so that the dentition on Mr. Boulenger's representation accords with that of *Zaocys* rather than *Zamenis*. I have skulls also of *Zaocys dhumnades* and *Z. nigromarginatus* which when compared critically with those *of Zamenis mucosus* reveal no differences that justify their being referred to different genera. The dentition of the three species is as follows:—

Species.	maxillary.	palatine.	pterygoid.	mandibular.
Z. mucosus	20—24	14—18	21—24	17—22
Z. dhumnades	23—25	19—20	25	25—26
Z. nigromarginatus ..	24—27	18—19	20—21	21—25
Z. tenasserimensis ..	26	,,	..	..

I think hardly any herpetologist will disagree with my opinion on the fact herein specified, that *Zamenis mucosus* should, in future, be known as *Zaocys mucosus*.

The change of an old established name for a common species with which we have grown familiar, is regrettable from every point of view. The fault lies with our systematists however, who group together species whose position is dubious, without even placing a query after the generic name. If skull characters are to be made the basis of classification then no systematist should fix the Genus of any species until he has skulls of every species.

Where skulls are not available, the generic name should be given dubiously in the text books which are supposed to guide us.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, 12*th February* 1914.

No. XXXIII.—ARE THE SNAKES *OLIGODON TRAVANCORICUS* (BEDDOME), AND *O. VENUSTUS* (JERDON) ENTITLED TO SPECIFIC DISTINCTION?

Whilst examining snakes in the British Museum collection in 1912 I was much struck with the close resemblance between specimens of Beddome's

Oligodon travancoricus and Jerdon's *O. venustus*. With the latter I am very familiar. I examined specimens of each, side by side, and failed to discover any reason for separating the two. Turning to Mr. Boulenger's Catalogue (Vol. II, 1894, pp. 235 and 236), the only differences are apparently as follows:—

travancoricus.	*venustus.*
(1) The frontal shield is shorter than the parietals.	The frontal shield is as long as the parietals.
(2) 3 infralabials touch the anterior chin shields.	4 infralabials touch the anterior chin shields.
(3) Dorsally there are bars.	Dorsally there are paired spots, usually united mesially.
(4) *Habitat.*—Travancore Hills.	*Habitat.*—South West India.

With regard to the first point I found that in one of the three specimens of *travancoricus* the frontal was fully as long as the parietals. The contact of the infralabials and anterior chin shields is not very constant in many species of this genus.

The dorsal mark in *venustus* are subject to considerable variation, the degree to which the spots are separated or confluent, as they are in other species, notably *O. subgriseus*. In the specimens of *travancoricus* indentations in the cross bars mesially and laterally are as pronounced as one sees in some specimens of *venustus*. Finally the habitat of *travancoricus* is contained within that of *venustus*. I think there can be little doubt that *travancoricus* has no claims to be considered distinct from *venustus*.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, 25*th February* 1914.

No. XXXIV.—ARE NOT THE SNAKES *SIMOTES THEOBALDI* (GUNTHER) AND *SIMOTES BEDDOMII* (BOULENGER) ONE AND THE SAME SPECIES?

In Mr. Boulenger's Fauna of British India, Reptilia and Batrachia (1890, p. 314) a snake is described under the title *Simotes beddomii*, which I cannot dissociate from Gunther's *Simotes theobaldi* for the following reasons. I have examined the two type specimens (the only specimens known) of *Simotes beddomii* in the British Museum, and being familiar with *S. theobaldi*, at once remarked upon the similarity between the two. A comparison of the two supposed species failed to show me any difference between them worthy of remark. In Boulenger's Catalogue (Vol. II, 1894) both are figured on plate IX, and the striking similarity between them is very noticeable. The descriptions of the two on pages 229 and 230, critically examined, show differences as follows:—

beddomii.	*theobaldi.*
Ventral, 167 to 168.	Ventrals 171 to 180.
Subcaudals 43 to 46.	Subcaudals 34 to 42.
Tail $\frac{1}{6}$ to $\frac{1}{7}$ bodylength.	Tail $\frac{1}{12}$ to $\frac{1}{13}$ bodylength.
A few scattered ventral spots posteriorly.	No spots on belly or square black spots posteriorly.
Habitat—Wynad.	*Habitat*—Burma.

I have now seen at least 15 specimens of *Simotes theobaldi* from Burma with a range of ventrals from 164 to 180, and a range of subcaudals from 30 to 42. The trifling differences in the ventral shields recorded in Mr. Boulenger's work therefore disappear.

The relative length of the tail to the body differs remarkably in the sexes of many species of *Simotes* and *Oligodon*, and it is noteworthy in this connection that the single adult *beddomii* is a ♂ and that 3 of the 4 specimens of *theobaldi* referred to by Boulenger were ♀. The disparity in this appendage in the two supposed species is probably of sexual import. Next while some specimens of *theobaldi* have square spots on the ventrals, others are unspotted, whereas in *beddomii* there are a few scattered spots on the belly behind. I have however had at least one specimen of *theobaldi* from Thayetmyo, Burma, with a few spots scattered irregularly on the hind belly. Lastly we come to habitat. In an article on another snake, *viz.*, *Simotes splendidus* in this Journal (Vol. XVIII, p. 782) I furnished very strong arguments for assuming that the habitat of the type of that species was Burma and not Wynad as reported by Colonel Beddome.

When I sent a specimen of *splendidus* from Burma to the British Museum in 1908 Mr. Boulenger in acknowledging the specimen wrote to me as follows:—"The habitat of the *Simotes splendidus* is very interesting. I wonder now whether Beddome's locality (Wynad, in his own handwriting) is trustworthy." It is very significant that no less than eight species now known to be denizens of Burma and Tenasserim, are only known from Peninsula India on the authority of Colonel Beddome who presented specimens to the British Museum with labels bearing the name of some locality in S. India! After what has been said of *S. splendidus* it is significant that the two type specimens of *beddomii* should be labelled from Wynad in Colonel Beddome's handwriting.

On the facts represented above I have little hesitation in suggesting that these two types of *beddomii* were collected in Burma, and inadvertently mixed with Colonel Beddome's South Indian collections. Once this possibility is admitted I venture to think that the types of *beddomii* will be identified as typical specimens of *theobaldi*.

F. WALL, Major, I.M.S.,
C.M.Z.S., F.L.S.

Almora, 24*th February* 1914.

No. XXXV.—SIAMESE FIGHTING FISH (*BETTA PUGNAX*).

Mr. F. H. Stone has a note in Volume XXII, No. 3, page 632, on this wonderful little fish. I have on several occasions kept several of these fishes. Each fish was kept in a white gin bottle and the following diet given, fine bread crumbs, a grain or so of boiled rice, for a change small morsels of earthworms, and as a real treat a few mosquito larvæ. The bottles must be kept at some distance apart in order that the fish may not see one another, for if they should do so they are kept in a perpetual state of irritation. When unperturbed they, as Mr. Stone remarks, look like very ordinary little fishes, but place two in a large glass salad bowl and then the fun begins: up goes the dorsal fin, each puffs himself out with pride as much as he can, at the same time displaying iridescent colours. With this fine play of colours their anger seems to have arrived at about the maximum. The swelling of the pouches from the lower part of the gills as noted by Mr. Stone imparts quite a bull-dog aspect to the fish. They are full of pluck and go for one another in real earnest, biting small pieces out. The defeated fish usually sinks to the bottom of the bowl, seems disinclined to rise, and gradually, unless pressed, takes on his normal appearance, the victor generally swims above swaggering about as if quite conscious of the fact that he is 'top dog.' We never allowed them to have more than two or three rounds, having been told that if we did so the defeated fish would be killed. I also received

instructions as to the treatment of beaten fish, which is to keep them in muddy or discoloured water for some few days; this serves the double purpose of healing their injuries and concealing their shame. They will go for little fish of the goldfish type without any hesitation and keep them swimming hard. They are most interesting creatures and if carefully looked after regarding changing the water, not keeping them for a long time in excessive light, etc. they live for some time. I understand in Siam, especially in Bangkok, fighting with these little fish is a popular pastime and much money changes hands. There is always some one with an undefeated fish and lots of owners ready to attempt to lower his colours.

G. H. EVANS, Colonel.

Rangoon, 25*th February* 1914.

No. XXXVI.—NEW SPECIES OF INDIAN GRASSHOPPERS BELONGING TO THE GENUS *HIEROGLYPHUS*, Krauss, AND THE GENUS *HIEROCERYX*, Bol.

(*With an Illustration.*)

For several years past, the common Rice Grasshopper (*Hieroglyphus banian*, Fabr.) has been an object of study in the Entomological Laboratory of the Mysore Agricultural Department. The main practical results of this study have already been published as Bulletin No. 1, Entomological Series of this Department. In connection with the study of the specific characters of this insect, I had the opportunity of examining the specimens contained in the Indian Museum as well as those in the Pusa collection, and soon became convinced that at least two distinct species had been included under this name. This view was strengthened particularly by the fact that, although a micropterous form of *H. banian* has been recorded and figured by Lefroy (Indian Insect Pests, p. 120., Indian Insect Life, p. 87.), we have never seen such a form either in badly infested paddy fields extending over thousands of acres, or among the hundreds of individuals reared in the Insectary here.

The micropterous form, moreover, was seen to show decided points of difference from *H. banian*, especially in the black markings on the prothorax and a long-winged form was found among the specimens included under *H. banian*, which possessed similar markings.

To settle the point, I obtained through the kindness of Mr. V. Ramachandra Rao, Assistant Entomologist, Madras Department of Agriculture, specimens of the micropterous form of *Hieroglyphus* along with specimens of the long-winged form collected at the same time, which apparently belonged to the same species. These, along with a second and distinct micropterous form reared from nymphs collected at Anavatti, Mysore State, were sent to Prof. Ignacio Bolivar, Madrid, for identification.

As I had anticipated, Prof. Bolivar reported that two distinct species have hitherto been placed under *H. banian*. One of these is the real *H. banian* for which, as far as I am aware, no micropterous form has yet been found. The other is a new species *Hieroglyphus nigro-replicatus*, Bol., which possesses both a normal and a micropterous form.

This new species has been described by Prof. Bolivar in the Trabajos del Museo de Ciencias Naturales, No. 6 of 1912, as follows :—

Hieroglyphus nigro-replicatus, sp. nov.

Robustus, virescens, in sicco pallide badius. Costa frontalis lata sulcata versus fastigium indistincte angustata cum vertice distincte rotundate conjuncta. Fastigium transversum, marginibus anterioribus crassis,

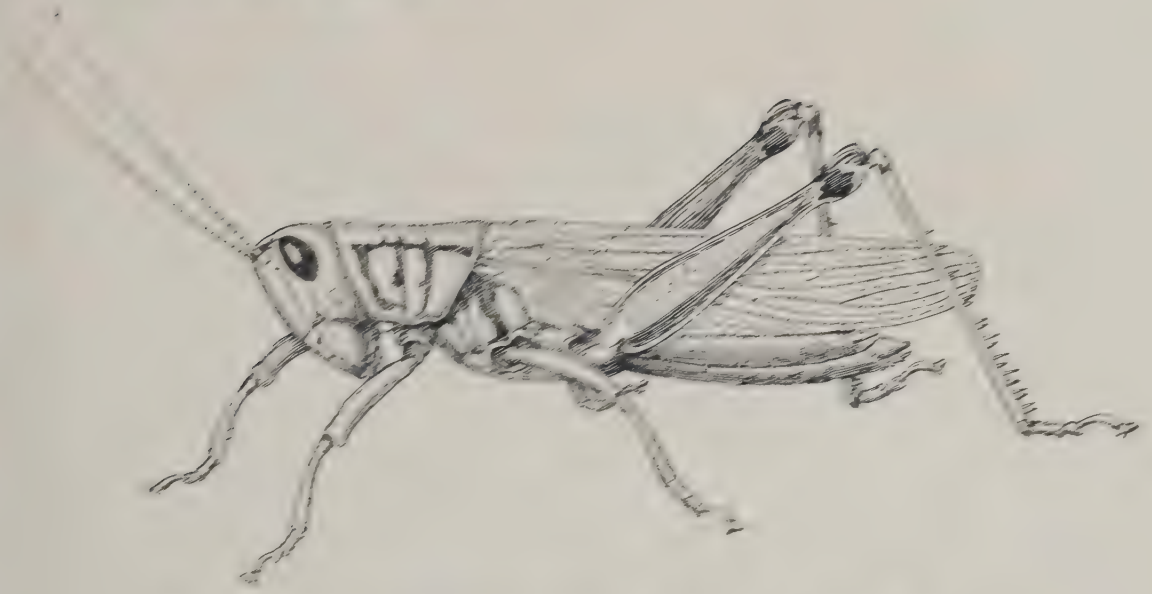


Fig. 1.—Hieroglyphus nigrorepletus, Bol. female, long-winged form.

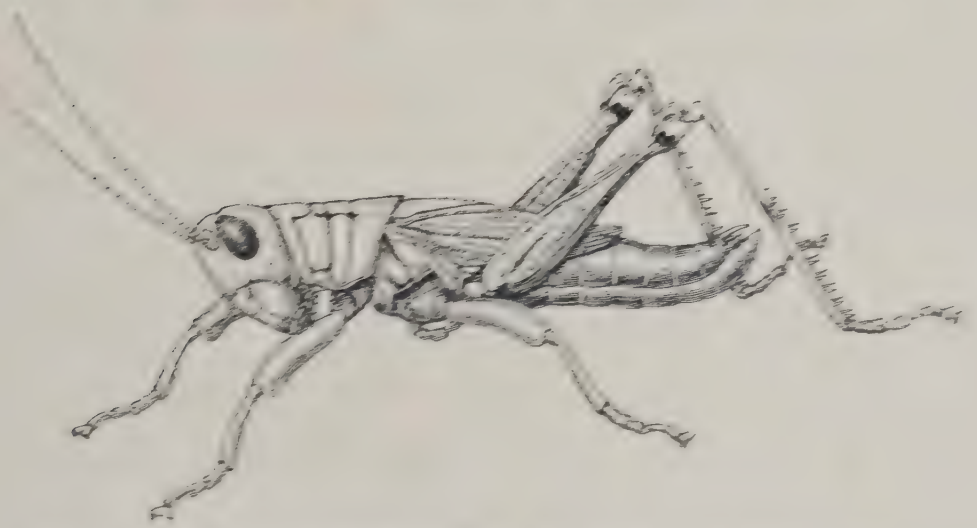


Fig. 2.—Hieroglyphus nigro-repletus, Bol. male, macropterous form.

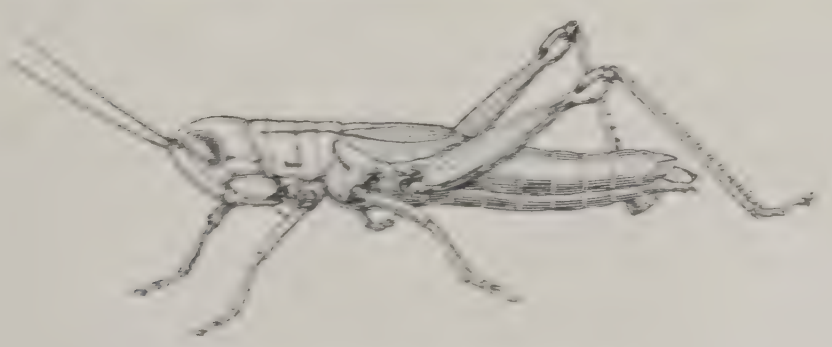


Fig. 3.—Hieroglyphus Daganensis, Bol.

impressopunctatis, inter oculos utrimque carinula instructum. Pronotum compressiusculum, dorso distincte planatum, postice obtusangulatum, sulcis in dorso leviter impressis, vel sub-oblitteratis et concoloribus, in lobis profunde impressis atque late nigro-repletis, pictura nigra sulcis superne ad loco carinarum lineis continuis in metazona retrorsum divergentibus formans, inferne inter sulcos primos linea nigra instructa, lateribus pectoris suturae late nigro pictae, prozona quam metazona haud sesqui longiora, postice obtusangula. Elytra apicem femorum valde longiora, lata, maxima parte hyalina, basi striga nigra, venae ulnariae nec non ramis radialibus nigris, areis radiali atque inter ulnari vena intercalata instructis. Alae amplæ, venis fere omnibus nigris. Spina prosternali acutissima. Lobi mesosternales fere æque longi ac lati, intus rotundato subangulati, spatio "X" formi medio angusto, antice posticeque valde ampliati sejuncti. Lobi metasternales breviter contigui. Lobi mesosternales in ♀ transversi inter se leviter distantes; mesosternales haud contigui. Pedes antici ♂ fortiter incrassati. Femora postica capitulo geniculari apice loborum excepto nigro vel per exceptionem, apice dorsali tibiarum anguste nigro marginato et basi capitulo intus extusque fascia transversa nigra superne interrupta. Tibiae omnes coeruleae, condylo posticarum pallido, annullo basali, linea inferiori longitudinali nec non calcaneis nigris. Segmentum anale ♂ late arcuato-sinuatum. Lamina supraanalis medio sulco percurrenti medio coarctato, basi utrinque carinula abbreviata obtuse posita, marginibus arcuatis prope apicem sinuatis. Cerci ante apicem subito et breviter subulati, superne subangulariter lobati et intus breviter tuberculati. Lamina subgenitalis breviter sed acute conica. ♀ Lamina supraanalis lanceolato-triangularis medio sulcata, sulco transverse interrupto. Cerci acuti graciles. Valvulæ inferiores ovipositoris brevissimæ extus basi fortiter bidentatæ ♂ ♀.

Long. corp. ♂ 43; pron. 9, 5 elytr. 37; fem. post. 20 mm.
" " ♀ 44; " 10; " 34; " " 22 "

Loc. Bombay. Col. del Museo de Madrid (de mi coleccion); Hadagalli, Bellary, Madras Presidency, sent by Dr. Coleman.

Forma *brachytera*.

Statura minore. Elytra valde abbreviata unicoloria, tantum basi striga fusca abbreviata, lanceolata, ante medium latissima prope apicem subito angustata marginibus antico posticoque sinuatis apice anguste rotundato. Lineis nigris lateralibus pronoti pone sulcum typicum haud continuatis.

Long. corp. ♂ 38; pron. 9, 5; elytr. 17; fem. post. 19 mm.

Lat. media elytrorum, 6, 2 mm.

Loc. Bombay et Bellary: India.

My collection and sent by Dr. Coleman.

Prof. Bolivar's description of the micropterous form requires a slight qualification. The statement given in the last line that the lateral black line on the pronotum does not extend behind the sulcus typicus is not always true. We have a short-winged female in our collection in which the lateral black line extends to the posterior border of the pronotum and in fact the black markings on the pronotum are practically identical with those he has described for the normal form. Lefroy's figure, which is also of a female, shows the same characteristics.

In addition to the Latin description, Prof. Bolivar gives a comparison between *H. banian* and *H. negro-repletus*, Bol., which I here synopsize from the Spanish original.

1. Colour. There is marked difference in the markings on the prothorax and sides of the thorax.

2. Size. *H. nigro-repletus* is more robust and shows no constriction in the prothorax. The anterior femora (in the male) are much larger, the

elytra much broader and their colour diversified by black nervations in the new species.

3. The mesosternal lobes are nearly straight along the inner edge in *H. banian* and leave a larger space between them than in *H. nigro-repletus*; in the latter species this space takes the form of an "X" widened at the anterior and posterior ends.

4. The metasternal lobes are approximated over a greater length in *H. banian* than in *H. nigro-repletus*, almost joining in the form of a suture.

5. The anal organs differ much in the two species. The two oblique wing-like lobes which are at the base of the supra anal plate in *H. nigro-repletus* are lacking in *H. banian*; the cerci in *H. banian* ♂ are bifid in *H. nigro-repletus* ♂ are simple; the subgenital plate in *H. banian* ♂ is very long and conical in shape, in *H. nigro-repletus* it is short; the valves of the ovipositor, in *H. banian* ♀ are long and narrow, the inferior ones having at the base two teeth of which one is very small; in the ♀ of the new species, the valves are short and the teeth at the base of the inferior ones are very strong and stout.

The accompanying figures 1 and 2 show a normal female and a micropterous male respectively of the new species *H. nigro-repletus*. A comparison of these figures with corresponding figures or specimens of *H. banian* will at once reveal the marked differences existing between the two species.

Along with the specimens of this new species of *Hieroglyphus*, further specimens of another micropterous form, which was found in small numbers associated with *Hieroglyphus banian* in the paddy fields at Anavatti, were sent to Prof. Bolivar. He has erected a new genus *Hieroceryx* to include this form and another Indian species to which Saussure had given the manuscript name of *Hieroglyphus bilineatus*; this latter species I have not seen. As Bolivar's descriptions are inaccessible to most Indian workers, I give them here in full, together with a synopsis of his comments.

Gen. *Hieroceryx* nov.

Corpus teres, compressiusculum. Frons valde obliqua cum vertice angulato conjuncta, costa tota sulcata ad fastigium angustiora. Fastigium transversum, in ♀ valde transversum, impressum, intervallo oculorum articulo primo antennarum latiore, in ♀ duplo latiore. Carinis lateralibus frontis inter antennas et oculos sinuatis et subinterruptis. Pronotum teres, compressiusculum, antice late rotundatum, postice obtuse angulatum carina media indistincta vel subtiliter instructa; sulcis transversis subtilis concoloribus; lobi laterales, elongati, subtus obtuse angulati, postice prope angulum posticum subsinuati. Elytra in species cognita abbreviata, lanceolata intus inter se tangentia. Alae brevissimæ. Prosternum spina acuta, ab antico posticoque compressiuscula. Lamina sternalis elongata. lobi mesosternales trapezoidales intus angulati, tangenti ♂ vel subtangenti ♀, spatio intermedio fortiter "x" formi, metasternales pone foveolas tangenti. Pedes antice breves in ♂ incrassati. Femora postica elongata: geniculæ apice carina dorsali subindistincte producta; lobi geniculares apice obtuse acuminati. Tibiae posticae cylindricaepræter spinas apicales intus extusque 9-10 armatæ, spinis intermediis latere interno sensim majoribus. Tarsi graciles articulis primo tertioque subaeque longis. Abdomen segmento anali rubusto. Lamina supraanalis trigona apice acute producta. Cerci ♂ lobati, ramosi. Lamina subgenitalis breviter conica. Lamina supraanalis utrimque sinuata basi sulcata, apice trigona, incrassata. Valvulae ovipositoris sinuatae, inferiores basi dente magno instructae.

This genus is close to *Hieroglyphus* Krauss. The following features however distinguish it from the latter.

1. The general appearance is different, resembling more the genus *Oxya*, Serv.

2. The lateral lobes of the prothorax although attached vertically give rise to no dorsolateral ridge as in *Hieroglyphus*.

3. The elytra and wings are very short.

4. The prosternal tubercle is small and antero-posteriorly compressed.

5. The mesosternal lobes touch in the medium line to form a space in the shape of an "x" both in the ♂ and the ♀, the space being smaller in the latter.

6. The cerci of the ♂ are extraordinary in form and complete the distinction from the genus *Hieroglyphus*. These organs which in the ♀ are very short and conical, in the ♂ are large and branched to form two lobes. The first lobe is concave posteriorly and the second lobe which arises from the base of the first is applied to it along its concave side. In addition, at the base of the two lobes, there is a third prolongation or appendage directed upwards. This plurilobal form of the cercus is undoubtedly a generic character, its detailed structure varying with the species.

Hieroceryx bilineatus, Sauss, *in litt.*

Pallide virescens, sicco stramineus, capite infra oculos linea nigra obliqua. Pronotum dorso nigro-bilineato lobis lateralibus sulco medio nigro, inferne colore nigro antrosum breviter producto; dorso impresso-punctato, metazona brevissima, parte pronoti inter sulcos posticos sita vix longiore, margine postica obtusissime angulata. Elytra dimidio femorum vix attingentia apicem versus angustata, apice oblique rotundata, ♀ subacuminata; venis radialibus nigris, usque ad medium approximatis, pone medium divergentibus, area internomedia venis transversis parallelis instructa. Femora postica superne apice angustissime nigro-marginata, geniculae basi intus extusque nec non basi loborum macula parva nigra ornatae. Tibiae posticae dilute coeruleae; condylo lineaque latere inferiore nigris. Lamina supraanalis ♂ marginibus crassis, subreflexis, ante apicem sinuatis, apice lobo parvo trigono producta, medio basi subsulcata. Cerci trilobati, lobo primo extus convexo, magno; lobo secundo erecto apicem versus valde ampliato; lobo tertio angusto subtereti, erecto. Abdomine subtus, segmentis pilosis, lamina subgenitalis conica parva. Segmentum anale ♀ postice arcuato, lamina supraanalis basi sulcata, lateribus depressis, ante apicem sinuatis apice obtuse triangulariter producta subincrassata ♂ ♀.

Long. corp. ♂ 22; pron. 3, 5.; elytr. 6, 5; femor. post. 11mm.
„ „ ♀ 36; „ 7, 8; „ 10; „ „ 17mm.

Loc. Indias orientales. H. de Saussure. "Col. del Museo de Madrid (de mi coleccion)"

Hieroceryx colemani, sp. nov.

Hier. bilineato colore et forme valde affinis sed fronte a latere visa convexa, distincte breviore, carinis frontalibus pallidis, oculis multo brevioribus haud duplo longioribus quam latioribus; pronoto metazona spatio inter sulcos posticos vix longiora; lobis deflexis longioribus elytra breviora, venis radialibus tantum prope apicem divergentibus, area internomedia indistincte venulosa. Lamina supraanalis trigona, levia, basi subindistincte sulcata ♀.

Long. corp. ♀ 34; pron 6; elytr, 8; fem, post. 21mm.

Loc. Anavatti, Dr. Coleman collegit.

This species was described from female specimens alone. Fig. 3 gives an accurate representation of it.

LESLIE C. COLEMAN,
DIRECTOR OF AGRICULTURE IN MYSORE.

BANGALORE, *February* 1914.

No. XXXVII.—NOTES ON BUTTERFLIES.

Papilio nomius, Esper.—Mr. T. R. Bell, writing about this butterfly, at page 755 of Vol. XXI of this Journal, gives its foodplant as *Saccopetalum tomentosum* and quotes Dr. K. Jordan as saying that *Polyalthia longifolia* is eaten by the larvæ also. It may be of interest to know that I have recently found this butterfly breeding on this latter tree. About the first of this month, I noticed a female of *P. nomius* depositing eggs all over a large tree of *P. longifolia* which was coming into new leaf. I secured a fresh sprout with an egg on it and put it in water in a breeding-box. The sprout withered, however, and I did not attempt to get more eggs. On the 4th instant I got two caterpillars on the same tree, and the next day got a third caterpillar. I could, no doubt, have got many more if I had tried, but in view of Mr. Bell's statement that the great majority of the chrysalides lie over for ten months or more until the following year, I remained satisfied with the three larvæ I had got. These pupated within 2 or 3 days of my putting them into the box. On 15th instant one butterfly emerged and on the 17th the other two—all three perfect specimens. The unusual spell of stormy weather, which we are experiencing just now in what should ordinarily be a really hot month is, no doubt, responsible for all 3 pupae "hatching out" so quickly.

Junonia almana, Linn.—On 14th instant, my Collector brought me in a perfect specimen of the west season form of this butterfly, the result, no doubt, of the present strange weather.

W. M. CRAWFORD,

SAMBALPUR, 20*th April* 1914.

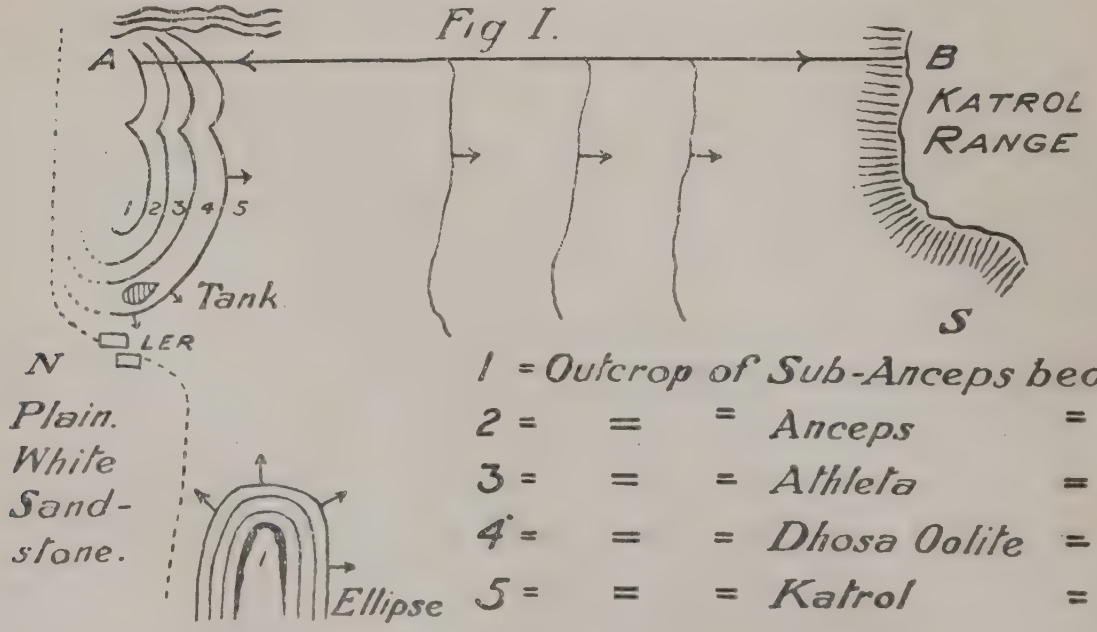
No. XXXVIII.—NOTES ON CUTCH AMMONITES.

No. V.

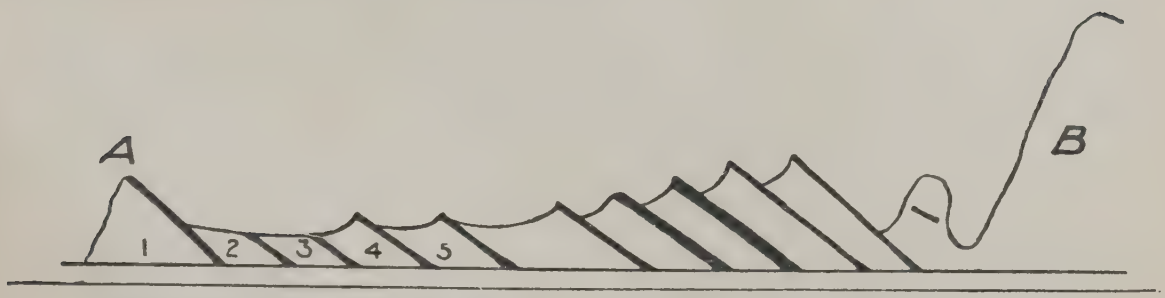
EAST OF LER.

In No. IV, while describing the East curve of the Ler-Hamundra Ellipse, I mentioned the fact that the outcrop of the Katrol-to-Anceps beds swings round to the East, dipping outwards for a short distance only to rise again as the flanking of another Ellipse to the East of Ler. I propose to sketch the ground just East and South-East of Ler in this latter-ground which though small in extent produces an enormous quantity of specimens well worth study.

This diagram shows how the ground lies:—



and this shows a general idea of the section A to B:—



Section from A to B. (rough) Fig II.

The high Katrol range backs the scene, lying a mile or more behind A and a long succession of jutting ledges of outcrops—hollowed here and there into deep depressions—leads you down steadily to the dark brown rocks of the lower Katrol strata, next to which you step on to the low yellowish D. O. ridge, whence a long flat slopeover soft Athleta and anceps beds brings you to the hard slabs of the Sub-Anceps beds which have proved less susceptible to weathering and rise in a slope to some 60 feet overlooking the plain.

An examination of the lie of the strata shows that the beds on the West of the hill near Ler dip outwards. Whether they curve right round along the North side, I cannot say: any how the surface shows that they spread out for some distance North-West of the hill before the white sandstone of the plain is encountered: and there are plenty of slabs of Anceps-crimson (marbled with shells) to be found on the fields North of the hills. So I am inclined to believe that here again you have a full anticline which if faulted at all is not faulted along the crest of the hills.

Just North-East of the point A, there are quarries of white grey stone which is not usual along this range: it may be a deposit of the Sub-Recent Concrete which the Revd. J. F. Blake described in the Q. J., Geol. Soc., May 1897, attributing its formation to the agency of wind.

Now as to the contents of the ground sketched. The inside of the hollow tooth of the two Sub-Anceps hills has just under the crimson-brown rocks of its shell a layer of what I call false conglomerate—a dense yellowish pavement with broad flat round-edged concretions of bulb crimson, and white ingrained. This bed is fairly constant also along the Ler-Hamundra Ellipse and the vanguard ridges of the Fahirwadi belt. It contains several belemnites—too cracked or broken for identification: also *Ostrea* and *Cucullea*. But so far I have not picked up any ammonites on these two Sub-Anceps Ler Hills.

The Anceps beds lying in the long broad hollow below (South of) the hills, produce a thin flat very-evolute *Perisphinctes*, akin to *Balinensis*, I should judge, a fairly perfect specimen. A similar one I found in the Sub-Anceps beds of the Ler-Hamundra Ellipse; and also another in Athleta beds along Fakirwadi. I cannot find any of Waagen's specimens which agree with these. *Perisph. obtusicosta* also appears: two specimens of what might be *angygaster* except for width of umbilicus, and a smaller specimen of the Obtusicostati subgenus. Of this class I may here say that Athleta and Anceps beds produce very numerous specimens, many in excellent preservation. Some may be Waagen's *omphaloder* or *dhosaensis* or *angygaster*; but the great majority clearly differ. In some in which the suture is visible the auxiliaries do *not* trend largely apicad as in Waagen's *obtusicosta* and *angygaster* but run down fairly straight: yet in ornament they agree only with Waagen's Obtusicostati sub-genus. Some have

earpieces at the mouth which appear to run straight, not inclined up or down as in Waagen's *amphalotes* and *ibexensis*. There are so many of these specimens findable and the differences are so marked that a monograph might well be written on them alone. I rather gather that this sub-genus (or section) of *Perisphinctes* has been differentiated off into a new genus since Waagen's day; but any ammonitist who may read this with any interest will probably know the style of ammonite to which I refer. Some are depressed, some compressed; ribs number about 15 in the 4th whorl, and are broad and rounded; some have branch ribs running straight, some curved forwards more or less strongly; some are more involute than others. In these same beds occurred a specimen of what looked like Waagen's *Oppelia orientalis*.

The D. O. beds bear much the same appearance as that of the same beds along Fakirwadi, Bharasar and Samatra, but the tilt being slighter, less of the slab surface is exposed and the scarp is not so high. Still here one could notice the fairly frequent occurrence of *Perisph. Rota*—too much engrained in the rock for extrication and certain identification. A new *Perisphinctes* of similar pattern and shape, but of much denser and finer ribbing turned up in good preservation. The mouth piece seems approaching the uncoiling stage of decline. The section is not high enough to class it with Waagen's *Obliqueplicatus*. Again these beds produce good specimens of *Stephanoceras*. One looks much like Waagen's illustration of *Steph. polyphemus*, except that its section is not so squarish. In Dr. Noetling's work on the Fauna of Mazar Drik in Beluchistan, we find that the original of Waagen's larger *polyphemus* has disappeared; and Dr. Noetling hopes that some equivalent of it may turn up. I daresay this is an equivalent but its lobes are not visible. Its diameter is 237 mm. Another *Stephanoceras* of flattened globular shape reminds one of *tumidum* but has quite a different suture. An *Aspidoceras* with clean double row of tubercles on high ribs reminds one of *Balemanni* or *Athleta*. Its shape is more like *Balemanni*: its suture more like *Athleta*; but the inner whorls are blocked. The discovery of an *Oppelia* from the D. O. beds close to the *polyphemus* (?) was of much interest. Oppeliæ of the *Trachyceras* group abound in Katrol beds close above D. O.; but D. O. is very reticent about their ancestors. Hence the interest; however the specimen was very fragile and broke up too easily; the fragments show (or seem to show) a clear inner half of the whorl: outer half with regular evenly-spaced low rounded ribs ending in tubercles on the siphonal edge.

But the Katrol beds are the distinctive feature here. 150 yards South-East of the tank you will strike a shallow nullah running West along the Katrol lines. It is a marvel of wealth. Every step you take you'll see the outer casts or fragments or protruding edges of some of Waagen's sub-genera of *Perisph. evolati*. From reading Dr. Uhlig's book on the Spiti shales I conclude that classification has somewhat changed since Waagen wrote; but here is an excellent field for studying the Cutch varieties of the Virgatosphinct and Aniacosphinct sub-genera. Most specimens picked up seem to belong to Waagen's *hollandicus* and *torquatus* types. I see that it is now recognized that Waagen's *torquatus* is not the same as Sowerby's; but as no new name has yet (it seems) been given to Waagen's, I must still call it by that name. However the specimens are so numerous and the divergences so minute that I cannot feel sure of having certified any; nor can one certify any without comparison with the type. Waagen was not able to give the sutures of any of these four similar sorts, *hollandicus*, *torquatus*, *katrolensis* and *pottingeri*. The hard brown rock of which these Lee specimens is composed shows up the sutures of many quite clearly. The lines are very similar to those of Uhlig's *Virgata spinosa*, the auxiliaries forming a

more or less long sutural lobe; but in most cases, the development of the second lateral is not interfered with by the exuberance of the auxiliaries. In some cases (of specimens which look like brothers) there is a difference, in that the 2nd auxiliary sometimes crosses the apex of the 2nd Lateral, sometimes does not. *Pottingeri* which is fairly common along Fakirwadi seems at a discount here. *Katrolensis* there is: also some other species which I can not identify with Waagen's: one may be *bleicheri*: it agrees in every point except with the high and sharp ribs named by Waagen: some may be *Chloroolithicus*. Several look much like Uhlig's *biplicatus*, except that the height of the last whorl is not pronounced enough. One half specimen looks very much like Uhlig's *Per. smith-woodwardi*. The cleancut Virgatosphinct ribs are few and only on the body chamber: but they are clean and decided: and moreover the ribs of both sides do not always *correspond* with the ribs on the other flank, as seems to be the case in Uhlig's back view of *smith-woodwardi*. (This non-correspondence of ribs is a very common feature of these Katrol specimens). But the specimen has the inner whorls mostly blocked by hard iron stone. The section shows great similarity in the development of the shape of the whorls. Other Katrol specimens are much like *Tibetanus* of Spiti, but are not *Aulacosphinct*.

I must leave the other peculiar specimens of that class. Description is of not much use. All I want to do is to induce some Ammonitologist to become interested.

A *Lytoceras* must be named. Its striæ, though thicker or more elevated in some places than in others, have *no* cremulations: but only the body chamber is visible: inner whorls if extricable might be interesting. *Phylloceras mediterraneum* (or what seems to be that) is also here. I have now some 10 specimens of this from Katrol beds, Waagen's were found much lower. There is also a worn half specimen of *Phyll. disputabile*: its lopes agree with Waagen's illustration of *disputabile's* lopes: it is not *lodaiense*. Waagen's *disputabile* came from Macrocephalus beds where I have also found them. There is also an *Aspidoceras* like *binodiferum* but with differing suture. *Oppeliæ* of the *Trachynota* group are not infrequent.

The layers of rock teeming with Ammonites die out very soon. I doubt if here they are more than 50 feet deep: near the Barapur Road (Fakirwadi Ridge) they extend for perhaps 300 feet of depth. The cold brown and red supervene and produce practically nil. I stalked across the ladder like outcrops for a mile up to the foot of the high range. That the rocks were marine was still evident for a rare belemnite here and there showed it; on one ridge perhaps 100 feet above the rich vein. I found an ammonite of, I think, the Evoluti with very early trichotone sharp ribs and at the foot of the high hill the fragment of another Evoluti. The outer cast of an *Aspidoceras* like *Subdistractum*—with very long spines I had found previously somewhere about the middle of this ridge ladder.

What with the multitude of forms not yet recorded from Cutch, and with the alterations which seem to be now necessary in Waagen's work (*e.g.*, *Polyphemus, Torquatus, Frequens*) and with the Spiti specimens available for comparison, it does not seem out of place to urge a fresh examination of the Cutch ammonites. If a member or a friend of the Society would take it up, there would be a fresh feather to plant in the Society's cap.

J. H. SMITH.

BHUJ, 25*th January* 1914.

PROCEEDINGS

OF THE MEETING HELD ON THE 16TH APRIL 1914.

At the "At Home" of the Bombay Natural History Society took place on the 16th April 1914, a number of specimens recently received from Lower Tenasserim in connection with the Mammal Survey of India, Burma and Ceylon were on view.

The election of the following 28 members since the last meeting was announced:—Mr. R. Spearman Armstrong, Colombo; Lt. L. H. Brunlees, Lahore; Lt. R. A. Savory, Lahore; Count E. Hoyos, Austria; Mr. F. W. Bakewell, Colombo; Major E. C. G. Maddock, I.M.S., Ahmednagar; Mr. C. G. Adams, I.C.S., Ahmednagar; Mr. E. Battiscombe, Nairobi; Hon. Mr. John Ross F. Lowis, Bettiah, B. & N. W. Ry.; Mr. G. L. Corbet, I.C.S., Saugor, C.P.; Capt. R. F. D. MacGregor, I.M.S., Bombay; Capt. R. Foster, Mussoorie; Lt. R. S. Wahab, I.A., Bangalore; Mr. N. Roy, Dacca; Mr. Syed Mahdi Hassan, England; Mr. R. R. MacFadden, Bilaspur, B. N. Ry.; Miss Pogson, Kotgarh, *via* Simla; Mr. J. W. Anderson, Rangoon; The Administrator, Porbandar State, Porbandar; Mr. Duncan Fraser, Bombay; Mr. Hector Menezes, Bombay; Major G. Knowles, Saugor, C.P.; Mr. John Still, Kandy, Ceylon; Mr. J. Morgan, Calcutta; Mess President, 86th Carnatic Infy., St. Thomas Mount; Mr. H. Trotter, I.F.S., Burma; Mr. A. R. S. Macklin, I.C.S., Hyderabad, Sind; The Diwan of Cochin, Trichur, S.I.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting:—

Contribution.	Locality.	Donor.
Nest of a Trap Door Spider and several other spiders in spirit 5 Snakes Several Mammals and a number of birds' nests.	Burma	Capt. F. E. W. Venning.
155 specimens of Bees and Wasps	Various	Mr. E. Comber.
4 legged Chicken and Skin and Skull of Yak.	Kurseong	Mr. A. Wright.
6 Gulls	Colaba	Mr. S. H. Prater.
3 Snakes 2 Scorpions	S. Kanara	Mr. A. P. Kinloch.
Skin and Skull of Woolly Wolf, European Wolf, Macaque and Imperial Sandgrouse.	Chitral	Capt. H. F. D. Stirling.
Head of Suleman Markhor	Malakhand	Major R. L. Kennion.
2 Masks of Kashmir Stag 6 Flying Squirrels and some Bats in spirit.	Chakrata	Major H. Fulton.
Anderson's Hedgehog	Jhelum District	Mr. F. J. Mitchell.
Stoliczka's Hedgehog	Karachi	Mr. T. M. S. Culbertson.

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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. Stuart Baker, F.L.S., F.Z.S., M.B.O.U.

Part XIV.

With Plates XIV and XV.

Pteroclurus senegallus.

The Spotted Sand-Grouse.

Tetrao senegallus.—Linn. Mantissa, p. 526 (1867-71).

Pterocles senegallus.—Shelley, B. Egypt, p. 220 (1872); Jerdon. B.I. iii, p. 504; Hume, Str. Feath. i, p. 221; *id*, *ibid*, 11. p. 331: *id*, *ibid*, iv, p. 4; Butler, *ibid*, iv, *id*; *ibid*, p. 508; Blanford, E. Persia, ii, p. 271: Hume, Str. Feath. v, p. 60; Butler, *ibid*, p. 222: Hume, *ibid*, vii, p. 161; Hume, Cat. No. 801; Butler, Cat., Bird. Sind, p. 53; Hume and Marshall, Game B. i, p. 53; Doig, Str. Feath. viii, p. 371; Tufnell, Str. Feath. ix, p. 200; Barnes, B. of Bom., p. 297; Oates, Hume's Nests and Eggs, 2nd Edit., iii. p. 366; Bulkley, Jour. B. N. H. S. xiii, p. 704; Nicol. Cumming, *ibid*, xvi, p. 641.

Pterocles senegalensis.—Blyth, J. A. S. B. xxiv, p. 303.

Pterocles guttatus.—Licht, Verz. Doubl., p. 64.

Pteroclurus senegallus.—Ogilvie-Grant, Cat. B. M., xxii, p. 14; Blanford, Avifauna. Ind., iv., p. 61; Ogilvie-Grant, Game B. i. p. 14; Oates, Game B. i., p. 31.

Pteroclidurus senegallus.—Sharpe, Hand B. i, p. 50.

Vernacular names.—Nango Katingo, Gutu (*Sind*).

Description.—Adult male—Crown of head and whole upper plumage to tail a soft isabelline-grey or isabelline, the tail covert-

and sometimes the rump suffused with bright chrome-buff; edge of the forehead, lores and round the eye grey, produced backwards as far as the nape, when it forms a collar, and on the neck and upper breast below the yellow-ochre chin, throat and ear coverts and sides of the neck; the grey on the breast runs up to the throat in a point and next to the back and breast merges into the colour of those parts. Scapulars pale isabelline brown at the base changing to a grey penultimate band with buff or ochre tips; wing coverts dull isabelline brown with buff tips, the innermost next the back all buff where visible, shoulder of wing, greater and median primary coverts isabelline-buff with brown shafts and suffused with brown at the tips; primaries the same and with all but the first three tipped and edged on the inner web with buff, this colour increasing in width towards the innermost primary; secondaries brown, narrowly edged with buff on the outer webs at the ends and gradually changing in colouration until the innermost are like the scapulars but always with yellow ochre, or chrome yellow, tip, not buff. Below the grey of the lower throat and breast gradually changes on the breast to a beautiful isabelline, purer and more pink than on the back, and covering breast, flanks and abdomen except the centre of the latter, which is black; under tail coverts white or pale buff with brown bases showing through; axillaries very pale buff, lesser under wing coverts buff, primary coverts brown. Central tail feathers like the back but produced in two long "pins" or filaments, which are dusky black; outer tail feathers brown with broad white tips, each succeeding pair having broader tips than the last; feathers of tarsus buff.

The range of variation in the colouration of this bird is not great; the upper parts are always isabelline, sometimes rather darker, sometimes rather lighter; rarely there is a vinaceous tinge in the back and scapulary region, and more rarely still there is a faint rufus tinge here; the scapulars themselves may be tipped buff or chrome-yellow and the extent and richness of these spots is the most variable feature in the upper plumage. In a few birds the crown is rather richer and more vinous than the rest of the upper parts.

Below the general tone varies to the same extent as above, and the richness of the yellow on the throat is sometimes wanting, the chin being somewhat albescent and the rest very pale; the extent of black on the abdomen is generally about the same but the colour is often more a chocolate brown than a black, and a pure rich black is seldom seen.

"Irides brown; bare orbital skin yellowish; bill pale plumbeous bluish grey or bluish white, always somewhat more dusky towards the tip; feet pale plumbeous or bluish white, paler towards the upper surface of the toes, and whitish on scales." (Hume.)

In some specimens the orbital skin has a tinge of green, though this is rare, and in some it is a pure pale lemon.

Dimensions.—Males—Length 13·4 to 14·7; expanse 23 to 23·7; tail from vent 5·3 to 6·0; wing 7·5 to 7·9; the wings when closed reach to within 2·3 to 2·8 of the end of the longest tail feathers, *viz.*, the central ones, which exceed the others by from 1·75 to 2·0; bill at front 0·44 to 0·47; tarsus 1·0 to 1·05. Weight 9 to 12 ozs. (Hume.)

My measurements which include those of all the skins in the British Museum average a little larger than Hume's do. Wing 7·50″ (192·2 mm.) to 8·20″ (209·6 mm.) with an average of 7·84″ (200·8 mm.); tarsus ·90″ (22·8 mm.) to 1·0″ (25·4″ mm.) with an average of ·93″ full (23·6 mm.) and bill at front ·45″ (11·5 mm.) to ·50″ (12·6 mm.) and averaging about ·48″ or a little over 12·2 mm.) The tail is anything from 5·0″ 127·0″ (127·0 mm.) to about 6·6″ (167·0mm.) or over.

Adult female.—Whole upper plumage, including wing coverts, scapulars and innermost secondaries isabelline of a darker, redder tint than in the male; the head is marked with fine central marks of black or dark brown, which from streaks, the rest of the upper parts are boldly spotted with dark brown, or black, the spots being boldest and largest and often tinged with grey on the scapulars and innermost secondaries, which feathers also have broad marks of chrome yellow at the tips on the outer webs. Lores and a faint mark of white round the eye and thence backwards takes the place of the grey in the male, but is finely marked with black and stops short of the nape. Remainder of under parts like the male but paler and less pink or vinaceous, and with the central of the abdomen more decidedly brown. The wing quills are the same as in the male and the tail also is similarly coloured. On the upper plumage the colour ranges from sandy isabelline to a rufus or vinous isabelline, extremes of either colour being decidedly rare. In many birds the yellow splashes on the scapulars are very faint, and in a few altogether absent. In a good many birds the buff below is almost white and is seldom at all rich; the yellow throat also is often very pale and the amount of spotting on the throat and breast is by no means constant, being very sparse on the lower breast in some specimens.

The colours of the soft parts are the same as in the male.

Dimensions.—Females:—Length 12·4 to 13·1; expanse 22·0 to 22·6; tail from vent 4 to 4·6; the central tail feathers only extending from 0·75 to 1·2 beyond the rest; wing 7·3 to 7·5; bill at front 0·4 to 0·44. Weight 8 to 9 oz. (Hume.)

Wing 6·96″ (176·7mm.) to 7·75″ (196·7 mm.) with an average of 7·35″ (186·5 mm.).

From the above it will be seen that I make the difference between

the male and female rather greater than Hume does as regards wing measurements. The tarsus and bill average respectively ·90" (22·8mm.) and ·43" (10·8mm.) respectively.

So far we have no description either of the young bird or of the nestling.

Distribution.—The Spotted Sand-Grouse (*Pteroclurus senegallus*) extends from Algeria, where, Whittaker says, it is very common, throughout the whole of Northern Africa, parts of the Sahara, North and South Nubia and Egypt and thence through Arabia, Palestine, Mesopotamia, Persia, Afghanistan, Baluchistan, and into N. W. India.

Within our limits Blanford thus defines their habitat. "Common in Sind west of the Indus, rare to the Eastward, but recorded from the neighbourhood of the Runn of Cutch, including Kathiawar, and from Jamboghora, West of Ahmedabad; also from Poharan between Jeysulmere and Jodhpore and from Shapur district in the Punjab. Mhow is given as a locality in the British Museum Catalogue for a specimen received from Col. Swinhoe, but in error the specimen thus marked is really from Pirchoki, below the Bolan Pass." As regards Kathiawar, Col. L. L. Fenton tells me that he has only seen a very few of these birds and that only in the cold weather in the North-East of the Provinces. He has met with them North of the Tabli Road Station in the Wadhwan-Ahmedabad Railway, though they were not common. Harrington Bulkley writing to the Journal from Kharaghora says that "they are found in numbers all along the Runn, 100 miles North of this."

To the West there appear to be no records beyond those of Blanford except a single bird reported to me as shot near Nagar in Jodhpore.

The greater number of the birds which visit India appear to be migrants from across the border during the cold weather, but there is no doubt that a considerable number remain all the year round. Bulkley in commenting on Barnes' note to the effect that "a few apparently remain to breed in Sind," writes "a fair number of them remain throughout the year as I have seen them in the hot weather and in the monsoon in Guzerat."

In the Trans-Indus country, Sind and the Punjab these Grouse are very numerous in the cold weather and a considerable number are also found in between the Indus and the Jhelum and Chenab. Further South they are numerous in Cutch and Guzerat and in the West of the desert country of Jusalmir and Mallani. East of this they are only found as stragglers in the winter months.

As regards their habits there is nothing on record to add to what Hume has already noted as follows: "Denizens of the desert as their plumage shews them to be at the first glance, they never advance far into the cultivation, to the imme-

diate neighbourhood of which they are attracted by the facilities for obtaining food.

"There is little to be said about their habits; they keep together in parties of from five to fifty; very often each flock, at any rate in winter, consists of one sex only; but occasionally I have found both sexes intermingled. They trot about on the dry soil picking up seeds and occasionally insects, or squat motionless sunning themselves in the early morning sun. They fly off to drink, morning and evening, often comparatively distant localities, and generally comport themselves much as *P. exustus* and *arenarius* do, but are more birds of the wilderness than these. I have never seen or heard of them in the enormous flocks or packs, in which the Large and Pin-tail Sand-Grouse are so often seen.

"In Jeysulmere, as Dr. Newnham informed me, and as I subsequently found, they are very abundant in the desert tracts South of the capital, slightly undulating stony plains, mingled with stretches of blown sand.

"Their flight is rapid and easy, but wherever I have met with them they have been less shy and easier of approach than *arenarius*. Their note is peculiar, and has been happily described as a gurgling sound, not unlike that produced by blowing through a small tube, one end of which is immersed in water. It has been syllabled as *quidle, quidle, quidle*, and this really does recall the note to a certain extent. It has appeared to me that the males of this species are more peaceably inclined, and not so given to perpetually skirmishing with each other as are those of *arenarius*.

"Their food is mostly seeds, but I found a good many insects mixed with these in the stomachs of those I examined, and they are, I infer, less purely vegetarians than the Large Sand-Grouse.

"Whether it is on this account I cannot say; indeed it may have been only fancy, but I have always considered that the flesh of this species was less dry and more palatable than that of any other Sand-Grouse. Even admitting this, I can only say that after eating hundreds of Sand-Grouse of most of our Indian species, I think them very poor food, only at all good when baked in a ball of clay, gipsy fashion."

Like most Sand-Grouse this particular species appears to breed over a very protracted period of the year, if not all the year through. Eggs, either from the oviduct or from the nest have been taken in each month of the year from February up to August, the earliest and latest dates being both of oviduct eggs.

There is very little indeed on record about the nidification of this Sand-Grouse. Whittaker records "Mr. Dodson found this Sand-Grouse remarkably numerous in the neighbourhood of Oumsinerma, not far from the coast of the Gulf of Syrtis, and obtained several specimens with the young and eggs of this species."

"According to Mr. Dodson, the male of this species, when nesting brings water to its female, and both parents give their young drink until they are able to fly."

Whittaker also says "it appears to be a late breeder, the clutch of three eggs here described having been taken by Mr. Dodson on July the 17th. These eggs are less glossy than those of *P. arenarius* and of a stone or buff colour, with very faint lilac-grey shell marks, and more distinct yellowish-brown surface blotches. They measure 41 × 27mm."

The other eggs of which I now have record are, three laid in confinement at Giza; two clutches of three from Sind, one in the possession of Mr. H. E. Dresser and one in that of the Rev. F. C. R. Jourdain; one egg from Mesopotamia and one oviduct egg taken by Dr. Hartert in Algeria, now in the Tring Museum; one egg taken by Blanford; Bulkley's two eggs now in my collection and a third oviduct egg sent me by a friend, and finally two oviduct eggs in the collection of Mr. J. Davidson.

We have, therefore, 20 absolutely authentic eggs of this species in addition to two other clutches taken by A. G. Tomlinson in the Bussorah district, Persian Gulf, about which I do not think there is any doubt. We can give a fairly general description of them, but before doing so it will be as well to go into some details of the different clutches.

Major R. Sparrow has been good enough to forward to me three eggs, from his collection, which were laid by captive birds in the Giza Zoological Gardens, Cairo, in June 1910.

In colour these eggs are a buff stone colour or pale creamy cafe'-au-lait, and they are marked all over with blotches, spots and specks of pale, rather reddish brown and with a few spots and specks, but no big blotches of very dark umber brown, in one or two cases almost black. The paler markings are very irregular in shape, here and there becoming broad irregular lines rather than blotches and in others looking more like accidental smears than anything else. The secondary markings are of pale brown, very washed out and ill defined, and pale lavender grey.

The texture is fine and the surface smooth, though there is very little gloss, but this may be due to the fact that eggs were evidently very hard set when blown. They are of the usual Sand-Grouse elliptical shape and measure 1·62″ × 1·13″; 1·60″ × 1·12″; 1·56″ × 1·09″; (41·3 × 28·6; 40·05 × 28·4; 39·6 × 27·6mm.).

Mr. F. C. R. Jourdain has also kindly sent me two out of a clutch of three eggs taken at Kotri in Sind on 16th May 1895 by Macdonald or Pearson? These agree well with the above in every respect and measure 1·66″ × 1·12″ and 1·65″ × 1·11″ (42 × 28·5 and 41·4 × 28·2 mm.). The measurement of the third, Mr. Jourdain tells me, is 42·6 × 28·5 mm. These eggs are even more minutely

speckled than Major Sparrow's eggs and have fewer of the very dark markings, though there are some of these present. They are also rather more glossy but otherwise much the same in general appearance. They were taken at Kotri, Sind, on the 16th May 1895 as were Mr. Dresser's eggs, which correspond with them also in appearance.

Coming next to the two eggs in the Tring Museum we find these differ in being rather more blotchy in their markings. An egg of *senegallus* taken in Mesopotamia, 15th May 1911, is a dull stone ochre in colour, freckled and blotched with light sienna brown, the biggest blotches being about ·1″ in breadth and the subordinate markings are of purple grey, but little paler than the superior marks, though they are more washed out looking; they are equally distributed throughout the surface, rather more numerous perhaps at the centre. It is of the usual elliptical shape, one end having a faint indication of a point, evidently abnormal. There is a distinct gloss and the texture is close and smooth. It measures 43 mm. × 28·5 mm.

The egg taken by Dr. Hartert, from an oviduct, on 22nd Apri 1899, is similar in general character but far paler and is probably, not fully coloured; it is a larger egg measuring 48·5 × 28 mm. There is practically no gloss and the spots are even more sparse.

Bulkley's eggs are fully described in the Journal and worth quoting in full. He says: "I think it is worth recording the fact that I have recently obtained the eggs of the Spotted Sand-Grouse (*Pterocles senegallus*). Mr. Fletcher, of the Salt Preventive Frontier Force, living fourteen miles North of this, shot some of these birds on the 19th instant and from three of them, one egg each was obtained. Two of these eggs are now in my collection, the third having the shell too soft to blow. The two eggs I have are pure white with the shell smooth and glossy. The fact of the two eggs being white is, I think, attributable to their having been taken from the birds perhaps a day before they would ordinarily have been laid, for it is a fact that the egg of some birds develop their colour after being laid and coming into contact with the light. I have taken eggs from Rain Quail which were pure white, whereas the eggs of this bird when ordinarily found in the nest are profusely spotted and sometimes boldly blotched with dark purple, the ground colour of the eggs being yellowish. In the same way I have taken an egg from a Florikan that was a very pale-blue and without any gloss, whereas the ordinary colour of this bird's egg is sap-green and the egg has a fine gloss over it. It is somewhat curious that the egg referred to by Blanford and Hume should be coloured and yet with little gloss, whereas my two eggs are pure white but decidedly glossy."

The two eggs, one taken by Blanford and described by Hume and the third, coloured egg in my own collection, agree in all parti-

culars with the egg from Mesopotamia in the Tring Museum. Mr. Davidson's two eggs only differ, in that one has a distinct tinge of green in the ground colour and has a few rouge lines in addition to the spots and blotches.

The 20 eggs vary in length from the small egg taken by Blanford, which is only 1·5″ (38·1 mm.) to the huge oviduct egg taken by Hartert which measures 1·91″ (48·5 mm.). In breadth the smallest dimensions are again those of Blanford's egg, *i.e.*, 1·05″ (26·6 mm.) and the broadest is one in my collection of 1·20″ (30 mm.). The average of the 20 is 1·66″ × 1·12″ (= 40·16 × 28·2 mm.) as against Dodson's average of 41 × 27 mm.

The dates on which the various eggs were taken are as follows :—

February 19th.—3 oviduct eggs, Bulkley, Khargora.
March 20th.—1 oviduct egg, Blanford, Shikarpur. Sind.
April 22nd.—1 oviduct egg, Harter, Algeria.
May 15th.—1 egg, Mesopotamia.
May 16th—Clutch of three, Jourdain, Kotri, Sind ; clutch of three, Dresser, Sind.
June 19th—2 clutches Tomlinson, Bussorah, Persian Gulf.
June ?—Clutch of three, Major Sparrow, Giza, Cairo, Egypt.
July 17th. –Clutch of three, Dodson, Tripoli.
August 14th.—1 oviduct egg, Stuart Baker, Sind.

There is little doubt that the Spotted Sand-Grouse breeds regularly in the deserts of Sind, but it is probable that they breed at great distances from where they drink and the would-be finder of their eggs must hunt for them well in the interior of the desert, and most remote tracts of desert. Tomlinson records that the eggs taken by him were deposited in mere hollows in the sand with no trace of nest.

Genus *SYRRHAPTES.*

The genus Syrrhaptes contains two species only, of which one comes within Indian limits. This can be at once distinguished from all other Sand-Grouse by its greater size—its wing is always over 9,″—by the want of a hallux or hind toe and by its tarsi being feathered all over, *i.e.*, behind as well as in front, and by the upper surface of its toes also being feathered.

It has the central tail feathers elongated as in Pteroclurus and the wings are long and strongly pointed. In general appearance it is a typical Sand-Grouse.

The genus is confined to Central Asia as a resident, but there are periodical rushes of *Syrrhaptes paradoxus* into Europe even as far as Great Britain.

Syrrhaptes tibetanus.

The Tibetan Sand-Grouse.

Syrrhaptes tibetanus.—Gould, P. Z. S., p. 92, 1850 ; *id*, B. Asia, vi, pl. 61 ; Blanford, J. A. S. B. xli, pt. II, p. 71 ; Hume and

Hend., Lahore to Yarkand, p. 279; Hume, Str. Feath. vii, pp. 162, 425; *id.* Cat. No. 802; Hume and Marshall, Game B. i, p. 43; Sharpe, Yarkand Miss. Aves, p. 119; Ogilvie-Grant, Cat. B. M. xxii, p. 5; Blanford Avifauna Ind. iv, p. 63; Oates, Game-B. Ind. i. p. 18; Sharpe, Hand-C. i, p. 50; Oates, Cat. Eggs, B. M. i., p. 75; Ogilvie-Grant, Game B. I., p. 6; Ward, Jour. B. N. H. Soc. xvii, p. 944; Le Mess. Game-B., p. 53; Bailey, Jour. B. N. N. Soc. xxi, p. 179.

Vernacular names.—Kuk, Kaling (*Ladak*) Kaka lingma, Kakali, (Tibet).

Description—Adult male.—Head from forehead to nape white finely barred with black, the forehead more streaked than barred and the lores either immaculate or very finely streaked: angle of chin white changing into dull orange yellow on chin, throat, fore neck and in a narrow band on the nape. Hind neck white narrowly barred with black, the ground colour changing into vinaceous buff, or buff on the upper back and the bars changing to vermiculations becoming most minute on the upper back; lower back, rump and upper tail coverts greyish white vermiculated with narrow black bands which are broadest and most definite on the rump; the rump and upper tail-coverts are often tinged with yellow, giving a sort of golden sheen to these parts. Scapulars, wing coverts and innermost secondaries buff, the greater secondary coverts, scapulars and secondaries often tinged with refescent and somewhat contrasting with the smaller coverts, the whole very finely vermiculated with brown and the scapulars also marked with large blotches of black on the inner web, these forming a narrow triangular patch on the back. Primary coverts and primaries black, the latter greyish towards the end and with large greyish buff marks on the inner webs of all, but the first four though obsolete on the fifth and sometimes on the sixth, outer secondaries gradually changing from the colour of the primaries to that of the inner secondaries. Axillaries black, under wing coverts on shoulder vermiculated brown and white, remaining aspect under wing brown. Foreneck and upper breast vinous grey or vinous white narrowly barred with dark brown or blackish, the ground colour deepening towards the lower breast and the bars becoming very narrow; lower breast vinous grey; abdomen, flanks and shorter under-tail coverts white, remaining under tail-coverts chestnut, barred with black and tipped white; these feathered white with tiny brown vermiculations. Central tail feathers like the rump and upper tail coverts but prolonged with long narrow webbed filaments of dark grey; remaining tail feathers like the longer undertail coverts.

The general tint of the upper plumage depends principally on the scapulars and the inner secondaries, the back and rump not differing much individuals. In some birds the first parts mentioned are quite

a bright pink vinaceous with the black markings almost entirely concealed by the ends of the over lapping feathers, in others, the feathers being abraded, the black spots from large patches and the surrounding parts are tinged with dark buff or yellow buff, sometimes even with buff ochre.

The yellow on the throat varies greatly in intensity and the markings on the breast not infrequently descend right down to the white abdomen. The thighs and feet are, also, sometimes quite thickly covered with fine dark bars.

"Bill and nails bluish horny; soles whitish" (Hume).

Dimensions—Males.—"Length 18 to 20; expanse 29 to 31; wing 9·9 to 10·5; tail (according to development of central tail feathers) 7·5 to 9·5; tarsus (which even in the fresh bird is very hard to measure) 1·1 to 1·3; bill from forehead to tip, 0. 74 to 0. 78." (Hume).

The small series I have been able to examine have had wings varying from 9·98" (254·5 mm.) to 10·63" (270 mm.) with an average of 10·35" (261·9 mm.). I have also measured tails up 10·4" (263·10 mm.) though this was unusually long and most are only about 8" (203·2 mm.).

Description—Adult female.—The adult female differs from the adult male in having the chin and throat albescent and more or less freely barred with brown; the breast is barred throughout and there is no intermediate band of grey between the barred part and the white abdomen. The whole of the upper parts and wing coverts which are only vermiculated in the male are regularly barred in the female, except the rump, upper tail coverts and central tail feathers and even these are decidedly more boldly marked than in the male. The general tint also is more grey and less vinous, though it varies in both sexes.

The upper plumage may be in general tone sandy-grey, grey much suffused with ochreous on scapulars and wings or grey with these parts as pink or vinous as in the male. There is a bird from Tibet and another specimen from Ladak in the British Museum which have as beautiful a pink vinaceous a tint as there is in any of the males, and they also have the wing coverts covered with fine stippling and vermiculations instead of the usual barring. One of these is probably a young bird, and though both are sexed females there may be some mistake. Below the extent of the breast differs in various individuals and in some birds is darker than in others. Soft parts as in the male.

Dimensions—Females.—"Length 6·5 to 118; expanse 27 to 28; wing 9·7 to 9·9; tail 7·0 to 8·4; tarsus 1·1; bill as before 0·72 to 0·73." (Hume).

I have been able to take the measurements of some 20 females and these bear out Hume's measurements in making the females decidedly smaller than the female. The wings vary from 9·80"

(248·8 mm.) to 10·45" (266·4 mm.) and have an average of 10·11" (256.8 mm.), the tails are also much shorter, seldom exceeding 8·5" (215.9 mm.) and generally below 8" (203·2 mm.).

Young male.—A young male has only faint traces of yellow at the sides of the neck; the barring on breast and back to tail is like that of the female, the deep black blotching to the scapulars is almost wanting, the median coverts and inner secondaries are much barred as well as vermiculated, but the rest of the wing coverts are marked as in the male. The wing of this bird is only 8·85" (223·8 mm.)

"*A quite immature male* resembles the adult female but has only a trace of yellow about the ear coverts, and the barring of the upper parts of the body is coarser and more irregular." (Ogilvie-Grant.)

Distribution.—"Thibet, extending Northwards to the Koko-Nor, West to the Pamir, and South to Ladakh and the Sutlej Valley." (Ogilvie Grant.)

Hitherto the Tibetan Sand-Grouse has only been found within Indian limits in Ladakh and the Sutley Valley, but it has been known to extend close to Sikhim in Tibet, and Blanford was given some cage birds by the Governor of Kambajong which were procured just across the border. Now, however, I have been sent eggs taken in Sikhim which are most undoubtedly those of *Syrrhaptes*, and, though they happen to be a very small sized set, they cannot be anything else but *tibetanus* as *paradoxus* could not possibly occur there.

Hume found them in great numbers on the Roopshoo plains about the Tso Mourari and Tso Khar and the head of the Pangong Lake, which is just inside the Eastern boundary of Ladakh. Biddulph also found them near this latter lake at 15,000 ft. and again at 18,000 ft. on the Karakorum Pass.

It descends only to about 12,000 ft. in the summer, but probably much lower in the winter months. Hume says: "I do not think I have ever met with this species at elevations above 17,000 or below 12,000 ft. but I have, of course, only seen it between 1st June and 15th September and during the colder months it may descend lower."

"Although it keeps on barren and desolate steppes in the neighbourhood often of rocky ranges, I have never seen it (the experience of other seems to be different) on these or on steep hillsides, and I have always noticed that there was sure to be some water, fresh or brackish, within a reasonable distance of its feeding ground.

"In the morning and afternoon it moves about on the more or less undulating semi-desert plains feeding on grass and other seeds and berries, and any young green shoots it can find. During the

middle of the day it squats about, especially if the day be hot, basking in the sun, very generally scratching for itself a small depression in the soil."

"Both when feeding and taking its siesta, it is not uncommonly in considerable flocks (I have seen several hundreds together); but in summer, at any rate, it is perhaps more common to meet with it in little parties of from three to twenty. Whilst feeding, it trots about more rapidly and easily than its short feather-encased legs and feet would lead one to suppose; individuals continually flying up and alighting a few yards further on, and now and again the whole flock rising and flying round, apparently without reason or aim."

"Sometimes it is very shy, especially in the early mornings and evenings; and though it will not, unless repeatedly fired at, fly far, it will yet not let you approach within 100 yards; but, as a rule, during the heat of the day, you may walk right in amongst them. They are precisely the colour of the sand when basking, and often the first notice you have of their proximity is the sudden patter of their many wings as they rise and dart away, and the babel of their cries, which, if the flocks be a large one, is really startling for a moment. Once up, they are off and away with a rapidity that takes a good shot, and a hard hitting gun to deal with satisfactorily, but they rarely at mid-day go far, and if the sun is bright, you may get shot after shot out of the same party by following them up.

"Early in the morning and quite at dusk they come down to the water to drink, by preference to fresh water, but, as at the Ts.-Khar, at times, to quite brackish water.

"They are always noisy birds when moving about, uttering a call somewhat like guk guk, to my ear, or again, as some people syllable it, "yak-yak," "cogo-cogo," &c., &c., but they are specially noisy in the evenings, when they come down to drink, and quite late in the evening when wearied with the day's tramp in these high regions, dinner discussed and the peaceful pipe achieved, one turns in for the night, their characteristic double cry may still be heard round the tents, pitched always, of course, when possible, near water."

Mountaineer remarks that they are met with in pairs, sometimes singly, and also in flocks of half a dozen or a dozen, on the hills and upland plains, at from 14,000 to 17,000 ft. They lie close until one gets within 50 or 100 yards, and then fly up with the usual chuckle, generally alighting again at no very great distance.

According to Blanford this "is a very noisy bird, often repeating its clanging double note when on the wing. Some caged birds that were given to me on the N. Frontier of Sikhim constantly uttered this call. The flight is swift."

Captain F. M. Bailey says that he found "these birds in flocks of from 10 to 20 anywhere North of the Tangla from August to

February and I have once seen them in May. They appear to have no special hour for drinking, and are not at all shy, so it is possible to walk up within gunshot distance when they are feeding on the bare plains. On being fired at a flock will only fly a hundred yards or so and will allow another shot to be taken in the same manner. In this way a flock could easily be exterminated, as they do not seem to get any wilder. I have seen them at Kambazong and at various places in the Brahmapootra Valley, West of Shigatse. I made every effort to get the eggs of this bird but without success."

There is practically nothing on record about the breeding of this fine Sand-Grouse, but Oates writes as follows about two eggs now in the British Museum Collection. "These two eggs were found by Mr. St. George Littledale, and . . . . although they have no further history, doubtless belong to this species. These eggs are perfectly elliptical, rather glossy and measure, the one 1·9 × 1·37 and the other 2 × 1·33. They are of a light stone colour with a number of pale purple shell marks and numerous surface dots and marks of reddish brown, evenly distributed over the egg."

Beyond the above eggs the only others are those mentioned by Colonel Ward and some others in my own collection. Colonel Ward writes *(in loc cit)*: "The Tibetan Sand-Grouse is found in flocks in Tibet and eggs were taken by Captain W. Leslie on the Eastern borders of that district on the 22nd, 23rd and 25th June."

One of these eggs which Colonel Ward gave to Dr. H. N. Coltart is now, through the latter's generosity, in my collection, and agrees well with a clutch of three eggs received from Sikhim and two others, one of three and one of two sent to me from Tibet. Those from Sikhim have no data with them except that they were got from a high plateau in the North-East of Sikhim by villagers in the month of June; those from Tibet were taken near the Chamb Valley on the 16th and 18th June. They are said to be common to in many parts of Tibet, and *very* common in some, but I have failed to get any more eggs, though Capts. F. M. Bailey, R. S. Kennedy, D. Macdonald and L. Weir have all collected for me very fine series of eggs of many extremely rare species.

All these eggs in my collection with the exception of Col. Ward's, resemble one another very closely and are exactly like the eggs *Syrrhaptes paradoxus* in the British Museum. The ground colour is a pale stone colour, in some being of a rather warmer tint more a creamy buff and the markings consist of spots, specks, and blotches, the last predominating, of brown, some yellowish, some reddish, the two tints varying in different specimens. The secondary marks are of the same character and in colour a washy purple grey or lavender grey, here and there being one of a rather deeper purple. The eggs have a fair gloss, in one clutch a rather

high gloss, and the surface is smooth with a fine, close grain, but the shell is rather fragile for so big an egg.

Col. Ward's egg has a pale pinkish 'brown ground colour,' the spots and blotches are rather larger and darker though less numerous. The eggs vary in length between 1·75″ × 1·17″ (44·4 × 29·7 mm.) and 1·85″ × 1·25″ (47·0 × 31·7 mm.).

(*To be continued.*)

SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

By Oldfield Thomas, F.R.S.

No. VIII.

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ON UPPER BURMA SQUIRRELS REFERABLE TO *SCIURUS SLADENI* AND *HARINGTONI*.

The presentation by Mr. C. S. Barton of a squirrel from the Upper Chindwin District of Burma related to *Sciurus sladeni* has given occasion for an examination of the specimens in the British Museum that have been referred to this species and to the allied *S. haringtoni*.

A specimen collected by Capt. F. E. W. Venning, the discoverer of *Petaurista lylei venningi*, has also just been received from the Bombay Natural History Society.

The skins before me, though few in number, show a remarkable diversity in colouration, and as this diversity is shown in ways not usually variable in squirrels, and as such specimens as do come from similar or near-by localities are quite identical, I have come to the conclusion that the different forms should have special names, as indicated in the following synopsis:—

A.—General colour of body above grizzled olive-grey or rufous ... ... *S. sladeni.*

a. Muzzle and feet rufous or ochraceous, no dark line separating upper and lower colours.

a^2. Back olive grey, not rufous.

a^3. Ochraceous colour on muzzle extending back nearly to ears. Feet more ochraceous... ... ... *S. sladeni sladeni.*

b^3. Ochraceous of muzzle not extending on to forehead. Feet more ferruginous ... ... *S. s. midas.*

b^2. Back washed with ferruginous .. *S. s. rubex.*

b. Muzzle and feet cream-buff. A dark demarcational line ... ... *S. s. bartoni.*

B.—General colour of body above cream-buff, below buffy ... ... *S. haringtoni*

a Under-surface buff. A distinct blackish line separating the flank and belly colours ... ... *S. haringtoni haringtoni*

b. Under-surface ochraceous buff. No demarcational line ... ... *S. h. solutus.*

The essential characters of *S. sladeni* and *haringtoni* have been

already described, and an excellent figure of the former given by Dr. Anderson.* The following are further details of the subspecies I recognize.

Sciurus sladeni sladeni, Anders.

Syn. *S. kemmisi*, Wrought.

Muzzle rich ferruginous nearly to the level of the ears, cheeks below eyes also ferruginous. Feet bright ochraceous (nearest to zinc orange or apricot orange of Ridgway).

Localities.—Tigyaing (Anderson); Katha (Kemmis.)

Sciurus sladeni midas, subsp. n.

As true *sladeni*, but the ferruginous of muzzle not extending on to forehead, or on to cheeks below eyes. Feet darker (ferruginous of Ridgway).

Condylo-incisive length of skull, 51·5; p. 4 and 3 molars 10·1.

Locality.—Myitkina. Alt. 600′.

Type.—Adult male. B. M. No. 11.7.31.1. Collected 2nd May 1911 and presented by A. W. Kemmis, Esq.

Sciurus sladeni rubex, subsp. n.

Like *S. sladeni midas* in the small extent of the rufous of the muzzle, the olive-grey cheeks, and the tone of the feet, but with the whole of the back strongly suffused with dark rich ferruginous, this suffusion also extending in a lesser degree on to the tail. Sides grey, ticked with buffy. Terminal third of tail deep ferruginous.

Dimensions of the type, measured in flesh :—

Head and body 214 mm; tail 254; hind foot 54; ear 22.

Condylo-incisive length of skull 49·5; p. 4 and three molars 9·6.

Hab.—Lonkin, Myitkina District.

Type.—Adult male, B. M. No. 14.4.3.7. Original number 50. Collected 22nd February 1914. Presented by Capt. F. E. W. Venning through the Bombay Natural History Society.

Readily distinguishable from the other forms of this group by the warm ferruginous suffusion of the upper surface.

Sciurus sladeni bartoni, subsp. n.

General pattern as in *sladeni*, but the muzzle, hands and feet are "warm buffy" instead of ferruginous, and, just as in *S. haringtoni haringtoni*, there is a distinct narrow blackish line separating the grizzled olive of the upper parts from the rich ochraceous buff of the belly and inner sides of the limbs; this line crosses the forearm half way down, but is not evident on the ankles. Terminal third of tail (instead of the usual fifth or sixth) rich ferruginous.

Dimensions of type, measured in flesh.—Head and body 227 mm; tail 260; hind foot 51·5; ear 21·5.

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* Zool. Yunn. Exp., pl. XX., 1878.

Skull.—Condylo-incisive length 52·2; p. 4 and 3 molars 9·5.

Habitat.—Uyu River, 20 miles N. W. of Mansi and about 50 miles E. of Homalin, Upper Chindwin. Alt. 900′.

Type.—Adult female. B. M. No. 14.6.18.1. Original number 3. Collected 24th March 1911 and presented by C. S. Barton, Esq.

By its buffy points and its dark demarcational line this striking form gives an indication of the essential relationship to each other of *Sciurus haringtoni* and *sladeni*, widely as they seem at first sight to differ from each other.

Sciurus haringtoni haringtoni, Thos.

General colour creamy buff, whiter on sides. Under-surface warm buff. A well marked narrow black line separating the colours of upper and under-surfaces; this line crosses the forearms and ankles. Muzzle, feet and tail pale cream-buff.

Locality.—Moungkan, Upper Chindwin (Harington).

Sciurus haringtoni solutus, subsp. n.

Like true *haringtoni* except that the feet and belly are a warmer buff (rather richer than ochraceous buff of Ridgway) and that there is no trace of a demarcational dark line on sides and across limbs. Back of ankles more or less buffy where the dark line crosses them in *haringtoni*.

Hindfoot of type, 53 mm.

Locality.—Homalin, Upper Chindwin (Harington).

Type.—Adult male. B. M. No. 5.8.11.2. Collected 2nd January 1905 and presented by Major H. H. Harington.

Even when first describing it I was doubtful if both the specimens of *S. haringtoni* could properly be assigned to a single subspecies, and now that I have seen something of the variations of the other members of the group, I am convinced that the form with the demarcational line should be separated from that without. In their general appearance, however, the two forms bear a striking resemblance to each other.

A NEW *LEGGADILLA* FROM KUMAON.

BY OLDFIELD THOMAS.

Leggadilla gurkha, sp. n.

Closely similar in general appearance to *L. sadhu* Wr., agreeing with that animal in both size and colour. But the fur is longer and softer, the flattened hairs being scarcely spinous at all, and, in the skull, the posterior palatal opening is less contracted, and m′ is of more normal shape, its anterior lobe less long and narrow: its accessory anterior cusp is however equally well developed.

If a very old specimen from Bageswar, darker coloured and more spinous than the type, is as I suppose referable to the same species, the mammæ may be recorded as 3—2=10, while they are 4—2 =12 in both *L. sadhu* and *platythrix*.

Dimensions of the type, measured in the flesh:—

Head and body 82 mm.; tail 73; hindfoot 18; ear 14·5.

Skull, greatest length 25; condylo-incisive length 23·7; greatest breadth 11·8; nasals 9·9; interorbital breadth 3·8; palatilar length 11.6; upper molar series 4.4.

Habitat.—Kumaon. Type from Jerna, Ramnagar, 1,500′; another specimen from Ramnagar, 1,100′, while the older specimen above referred to came from Bageswar, 3,200′.

Type.—Adult male, B. M. No. 14. 12. 1. 1. Original number 4,349. Collected 24th January 1914 by C. A. Crump and presented by the Bombay Natural History Society.

While the Jerna and Ramnagar specimens are quite like *L. sadhu* in their pale fawn colour, that from Bageswar is as dark as *L. platythrix*, but will probably prove to be exceptional in this respect. Its mammary formula, 3—2=10, will in any case distinguish it from the older known species.

Hodgson's *Mus cervicolor*, somewhat similar in colour to *L. gurkha*, is unquestionably a *Mus* and not a *Leggadilla*.

NOTES ON *VANDELEURIA*

BY OLDFIELD THOMAS.

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The inclusion of a number of Tree-mice, belonging to two different forms, in the Survey's collection from Kumaon has induced me to make a further study of the genus *Vandeleuria*, which had already attracted the attention of Mr. Wroughton and Miss Ryley.

The members of this genus would seem to be divisible into two groups by size, this being most correctly gauged by the length of the molar tooth-row, the size of the skull itself being sometimes a little deceptive. In the larger forms the tooth-row is about 3·4 to 3·6 mm. in length, while in the smaller one it ranges from 3·0 to 3·3.

In the Western parts of India, Bombay and the Western Ghats, two forms are to be found, a large and a small, the large one ranging from Kolaba, near Bombay, down the Ghats, through Coorg to the Nilgiri Hills, whence a specimen was named *Mus nilagiricus* by Jerdon. To this form Miss Ryley assigned the original *V. oleracea* of Sykes, from the "Deccan," basing her conclusions on the size of the skull of the type. But unfortunately that type is a very old specimen with an overgrown skull, and its teeth show that it

really belongs to the small Bombay form, which she calls *V. wroughtoni*, on a series collected by Mr. Wroughton, and of which we also have specimens from Ahmednagar, where Major Sykes probably got the type of *oleracea*.

This small form extends northwards to Kumaon, but becomes there of a duller colour, and a subspecies is made below on this account. Examples from Nimar and Sehore tend to be intermediate.

From Mr. Crump's Bengal collection (Hazaribagh) one specimen has come, and this may be provisionally referred to *V. oleracea*, thus marking the eastward extent of the range of this species.

Another Western form is the well-marked *V. spadicea*, Ryley, from Gujerat, characterised by its pale sandy colour. It is related to the larger species, and may prove to be linked by intermediate specimens with the comparatively dull-coloured *V. nilagirica*.

The second form found in Kumaon is also a member of the large group, but is of a much redder colour than any hitherto referred to. It is described below. Curiously enough our only specimen from Ceylon is so similar to this that I can see no reason to distinguish it, so that the species will probably be found to range down the Eastern half of India, just as the dull-coloured *V. nilagirica* does down the Western.

Then in Nepal comes the bright rufous, small-toothed, *V. dumeticola*, Hodgson, which ranges thence eastwards into Assam and Burma, though the material is as yet too small to indicate its variations there. A single skin was got by Mr. Shortridge on Mt. Popa, and this, which is apparently not separable from *dumeticola*, may be provisionally taken as representing Blyth's "*Mus badius*" from Schwe Gyen, Pegu.

Finally comes a still smaller form, described below, from Chantaboon, Siam, the furthest Eastern Record of the genus.

The sketchy and provisional nature of these notes shows how much still remains to be done with the smaller Indian Muridæ, while the fact that they have been able to be written at all indicates what has been done by the Society's Survey. For before the Survey nothing was known of the variations and detailed distribution of this interesting genus.

Descriptions of new forms:—

Vandeleuria oleracea modesta, subsp. n.

Size and general characters of *oleracea*, but colour duller and less sandy or buffy. Dorsal colour near wood-brown, not or scarcely becoming more buffy laterally. Hands and feet dull white, not

buffy. Dimensions of the type, measured in flesh :—

Head and body, 72 mm., tail 102, hind foot 19, ear 14.

Skull, see table below.

Habitat.—Kumaon. Type from Ramnagar, 1,100'.

Type.—Adult male. B. M. No. 14. 12. 1. 2. Original number 4,050. Collected 5th December 1913 by C. A. Crump. Eight specimens, all from Ramnagar.

The teeth range from 3·2 to 3·4 mm. in length, and therefore touch the lower limit of the larger forms (*nilagirica* group), but there can be no doubt that the real relationship of this animal is with *oleracea*, of which it forms a duller coloured local race.

Vandeleuria rubida, sp. n.

Size comparatively large, nearly equalling *V. nilagirica*. General colour above bright rich rufous (tawny of Ridgway) very much as in the more Eastern *V. dumeticola*. Sides paler, edged with a narrow tawny line. Under surface white, inconspicuously suffused with fulvous on the belly. Ears dark brown. Hands and feet buffy. Tail uniformly brown.

Skull large, strongly built, supra-orbital edges square.

Dimensions of the type, measured in the flesh :—

Head and body 78 mm., tail 124, hind foot 18·5, ear 15.

Skull, see table below.

Habitat.—Kumaon. Type from Bageswar, 3,200'.

Type.—Adult female. B. M. No. 14. 12. 1. 3. Original number 3,800. Collected 30th September 1913 by C. A. Crump.

This beautiful species differs from the large western *V. nilagirica* by its bright reddish coloration, and from the red eastern *V. dumeticola* by its larger size.

A specimen from Ceylon, collected by Mr. E. E. Green, is apparently not distinguishable from the type.

Vandeleuria sibylla, sp. n.

A very small species, allied to *V. dumeticola*, but still smaller.

Form slender, hands and feet markedly less stout than in the Indian species. General colour apparently dark rufous, probably about as in *V. dumeticola*, but not exactly definable on the spirit specimen.

Skull small (see dimensions), the brain-case markedly narrower and less swollen than in *dumeticola*. Palatal foramina comparatively short. Molars smallest of the genus.

Dimensions taken on the spirit specimen :—
Head and body 55mm., tail 96, hind foot 16·8, ear 12.
Skull, see table below.
Habitat.—Southern Siam ; type from Chantaboon.
Type.—Adult female in spirit. B. M. No. 97. 4. 6. 3. Collected and presented by Capt. Stanley S. Flower.

Skull measurements of types.

	Vandeleuria oleracea	modesta.	rubida.	sibylla.
Greatest length		21·5	23·4	19·7
Condylo-incisive length...		19·6	21·2	17·8
Nasals		7	7·8	—
Interorbital breadth ...		3·2	3·4	2·9
Breadth of brain-case ...		10·5	10·7	9·6
Palatilar length		9	9·8	8·4
Palatal foramina ...		4	4·6	3·6
Upper molar series ...		3·2	3·5	3·0

A NEW BURMESE SQUIRREL.

BY OLDFIELD THOMAS.

SCIURUS PYGERYTHRUS JANETTA, subs. n.

The Upper Burma representative of the Pegu *pygerythrus*.

Size and general characters quite as in true *pygerythrus*. Colour above finely grizzled grey, with or without a buffy suffusion. Under surface white or buffy, clear on the throat, chest, middle line of belly, and inguinal region, mixed with greyish on the sides of the belly. A marked and prominent patch on the outer side of the hip of the same colour, white or buffy, as the belly. Hands and feet wholly white or buffy, as are also the light rings on the tail and the middle line of its under surface. Tip of tail black.

Skull quite as in true *pygerythrus*.

Dimensions of the type, measured in flesh.—Head and body, 198 mm ; tail 199 ; hind foot 45·5 ; ear 21·5.

Skull.—Greatest length 46·3; condylo-incisive length 42·3; zygomatic breadth 28 ; nasals 13·3 ; interorbital breadth 16·2 ; front of p^4 to back of m^3 8·2.

Hab.—Upper Burma. Type from Mandalay, 200′. Others from Kyauk Myaung, Pyawbwe, Mingun, and Mount Popa.

Type.—Adult male. B. M. No. 14·12·1·4. Original number 3150. Collected 28th June 1913, by Guy C. Shortridge. About sixty specimens examined.

This Upper Burma representative of *S. pygerythrus* is remarkable for its dimorphism, specimens with clear grey backs and white bellies and feet being taken at the same places and dates as others

with buffy suffused backs, and buffy bellies and feet. In the buffy phase it is very similar to the true *pygerythrus*, from which it differs by its light hip-patch and wholly light feet. In *S. pygerythrus* there is no hip-patch, and the feet are only light at their extremities, and, sometimes, along their hallucal edges. The type of *S. p. janetta* is in the grey and white, not the buffy phase.

From the local form of *S. lokroides*, *S. l. mearsi* Bonhote, described from the Lower Chindwin, which has some resemblance to it, *S. p. janetta* may be distinguished by its black tail-tip, more wholly white feet, and by the absence of the buffy inguinal patches present in that animal.

I have ventured to apply to this pretty squirrel the name of Mrs. Fell, wife of Mr. G. B. H. Fell, C.I.E., I.C.S., to whom Mr. Shortridge has been considerably indebted in doing his collecting work.

TWO NEW FLYING SQUIRRELS.

BY OLDFIELD THOMAS.

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PETAURISTA ANNAMENSIS, sp. n.

A rufous, white-muzzled, and white-speckled species like *P. candidulus*, but the tail blackish as in *P. yunnanensis*.

Size about as in *P. candidulus*. Fur medium; hairs of back about 30-32 mm. in length. General colour deep rufous, speckled with white on the back, more profusely than in *P. yunnanensis*, less so than in *candidulus*. Head more speckled than the back, muzzle and cheeks greyish white, whisker-patch brown. Orbits narrowly edged with black. Ears long, the short-haired part (prœctote) dull whitish, the long-haired posterior part (metectote) black, continuous with a patch on the head behind them. Parachute dark rufous above, without speckling. Underside uniform pale rufous; chin black, throat greyish or greyish rufous; undersurface of parachute daker rufous than the belly. Hands and feet black. Tail like the body for its basal fourth, then uniformly brownish black, the tip quite black.

Skull with the frontal processes of the premaxillæ broader than the posterior part of the nasals, these being about equal in breadth in *P. candidulus*.

Approximate dimensions of the type, measured in skin :—

Head and body 450 mm.; tail 410.

Skull, greatest length 76; condylo-incisive length 71·5; zygometric breadth 49·5; nasals 24·5 × 14·7; interorbital breadth 18; palatilar length 36; upper tooth series exclusive of p^3 15·2.

Habitat.—Southern Annam, type from Bali, near Nhatnang. Alt. 150 m.

Type.—Adult male, B. M. No. 6.11.6.14. Original number 29. Collected 10th November 1905, by Dr. J. Vassal.

This is the *Petaurista yunnanensis*, Anders. of Bonhote's paper on Dr. Vassal's Annam Mammals*, but is distinguished from Anderson's species by its whitish muzzle and white speckled crown and nape; also by its shorter and poorer fur. A Flying Squirrel from Songen, Bienhoa Province, Lower Cochin China, collected by Pierre, also appears to belong to this species.

PETAURISTA TAYLORI, sp. n.

General appearance of *P. annamensis*, but tail dirty whitish as in *P. candidulus*.

Size about as in *P. candidulus*. Fur shorter and coarser than in that species; hairs of back about 28—30 mm. in length. General colour above deep rich rufous, as in *annamensis*, the dorsal area speckled with white, but to an even less extent than in that animal, the speckling being confined to the region from withers to rump. Muzzle and cheeks hoary grey, the bases of the hairs grey-brown, the tips white. Crown rufous, speckled with white, the speckling not extending back on to the nape. Ears with their præctote white, their metectote and a large patch behind them prominently black. Edges of interfemoral membrane black. Tail with its basal fourth dull ferruginous washed with black, then drabby washed with white, the extreme tip black.

No measurements available, but size apparently as in *candidulus* and *annamensis*.

Habitat.—Southern Tenasserim. Type from near Bankasun.

Type.—Adult skin without skull. B.M. No. 14.12.1.5. Original number 4590. Obtained as a skin by G. C. Shortridge. Presented by the Bombay Natural History Society.

This Flying Squirrel is related to both *P. candidulus* of Upper Burma and *P. annamensis* of Annam and Cochin China, differing from the first by its less profuse white speckling and its black ear patch, and from the second by its whitish tail. Quite possibly all three will hereafter be considered as local sub-species of a single form, but without further material such linking-up would be premature.

At Mr. Shortridge's suggestion I have named this handsome animal in honour of Mr. J. A. Taylor, Manager of the Tenasserim River Rubber Estate, from whom much help has been received in forwarding the objects of the Survey.

* P. Z. S., 1907, p. 8.

A POPULAR TREATISE ON THE COMMON INDIAN SNAKES.

ILLUSTRATED BY COLOURED PLATES AND DIAGRAMS

BY

MAJOR F. WALL, I.M.S., F.L.S., C.M.Z.S.

Part XXIII (with Plate XXIII, Diagram and Map.)

(Continued from page 43 of Volume XXIII.)

Family—COLUBRIDÆ.

COLUBER RADIATUS.

THE COPPER-HEADED RAT-SNAKE.

History.—The first mention of this snake in literature is by Russell who figured it in his Second Volume published in 1801. The plate (XLII) is an excellent one taken from a specimen received by him from Java. In 1837 Schlegel figured it, and christened it. Since then almost every herpetologist writing on Asiatic snakes has referred to it.

Nomenclature—(*a*) *Scientific.*—The generic name introduced by Linné in 1766 is from the Latin "coluber," a word applied indiscriminately to any snake. "Radiatus," from the Latin implying "radiating," emanated from Schlegel, and refers to the three black lines that radiate from the eye like the spokes of a wheel.

(*b*) *English.*—The copper-headed rat-snake suggests itself to me as distinctive, and appropriate.

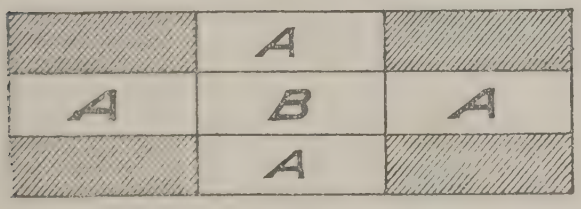
(*c*) *Vernacular.*—In Upper Assam (Dibrugarh) I heard it called "goom phitti."

General characters.—This is a handsome species of moderately large proportions, ornamental in colouring, and distinctive in its markings. The head is moderately elongate, smooth, and evenly rounded from side to side, showing little evidence of a canthus rostralis. The snout is obtuse. The eye is moderate in size and the iris golden or golden brown especially towards its pupillary margin. The nostril is deep vertically and occupies the whole suture between the anterior and posterior nasal shields. The tongue is pale at the base, and has black tips. The body is elegant in form and distinctly compressed, its surface ribbed longitudinally with keels. The tail is round in section, and moderately long, being about one-sixth the total length.

Colour.—The head in life is a copper colour, or dull orange, and this tone merges to a duller one at the neck. A transverse black stripe passes across the head at the posterior limit of the parietal shields. This sends black limbs forwards to the eyes, and frequent-

ly two black limbs backwards which pass for some distance down the back. The ends of the transverse stripe turn backwards, and are continued as stripes down the back parallel to the median, and thicker stripes just referred to. Two short black streaks pass from the eyes, one downwards, and one obliquely backwards.

Anteriorly the body is adorned with black longitudinal stripes, usually three in number on each side, and progressively narrowing from above downwards; the lowest usually more or less interrupted being placed near the edge of the ventrals. The median are usually connected with the black collar but may commence further back as in our plate. These black marks are very faintly visible in the cast skin. The ground colour is yellowish, brownish, ruddy brown, or leaden grey vertebrally, merging to lighter tones in the flanks. The skin anteriorly is chequered as shown diagrammatically in the attached figure. The shaded oblongs are black, oblongs A are a pale blue-grey, and oblong B bright yellow. The effect is very striking when the snake under excitements inflates itself, and reveals these hues.



Posteriorly the body loses its black stripes, and is uniformly light-yellowish, brownish or leaden grey dorsally, merging to lighter tones in the flanks. The belly is whitish, or pale yellowish often more or less obscurely mottled with greyish especially posteriorly, and beneath the tail. The young are coloured and marked exactly like adults.

Dimensions.—Adults usually vary from five to six feet. My largest of 32 measured specimens was a ♀ 6 feet and $\frac{5}{8}$ of an inch. Stoliczka had one 6½ feet long in the Sikkim Terai, Mr. Frere wrote to me of one he got in Tharrawaddy 6 feet 10 inches long, and the Revd. C. Leigh wrote to me of one he captured at Kurseong exactly 7 feet.

Identification.—Attention must be paid to the following points which must coexist. (1) Scales in 19 rows anteriorly (two heads-lengths behind head), 19 rows in midbody, and 17 posteriorly (two headslengths before vent). Median rows with keels. (2) An entire anal shield. (3) Ventrals 224 to 250. (4) Subcaudals 83 to 106. (5) A black transverse mark on the back of the head. I know of no simpler method of identification.

Haunts.—Its favorite haunts appear to be in open fields near jungle, but it will wander anywhere in search of food. It will take to the water readily, and swims actively, and strongly even in a swiftly flowing river in flood. In Rangoon one was brought to me that had taken up its quarters in a bullock cart, in which it was

found coiled up asleep. It is not unusual for it to come into habitations, and as its sole purpose is probably to hunt rats, it should be encouraged as a benefactor.

Disposition and Habits.—Without being an aggressive snake, it is certainly a plucky one that will strike, and strike viciously when suddenly encountered, or driven into an uncomfortable situation. At such times it will erect the forebody, and strongly compress the neck, forming a sort of pouch in the throat, just as the common rat-snake (*Zamenis mucosus*) does. I have little doubt that it emits the same warning snoring sound, though I have not actually heard this. It is very active, and difficult to capture alive usually menacing with such determination that its would-be captor hesitates to seize it, and finds by his hesitation his chance has gone. It is a remarkable fact that of all the fifty odd specimens I have had, one only was less than $3\frac{1}{2}$ feet. It would seem that the young are specially active, and able to evade danger.

Food.—It seems to feed exclusively on mammals, and especially rats. I have on two occasions found a large rat in the stomach, and once four blind and callous offspring almost certainly belonging to a rat. At other times I have found mammalian hair in the stomach or intestine, that suggested a murine victim.

The sexes.—My notes leave much to be desired in this direction. Of 25 sexed in Assam 18 proved to be females. As regards size my notes make it appear that the sexes grow to the same length. There seems no special difference in the length of the tail in the sexes, unlike what is usual in other species. The anal glands secrete an ochraceous coloured matter.

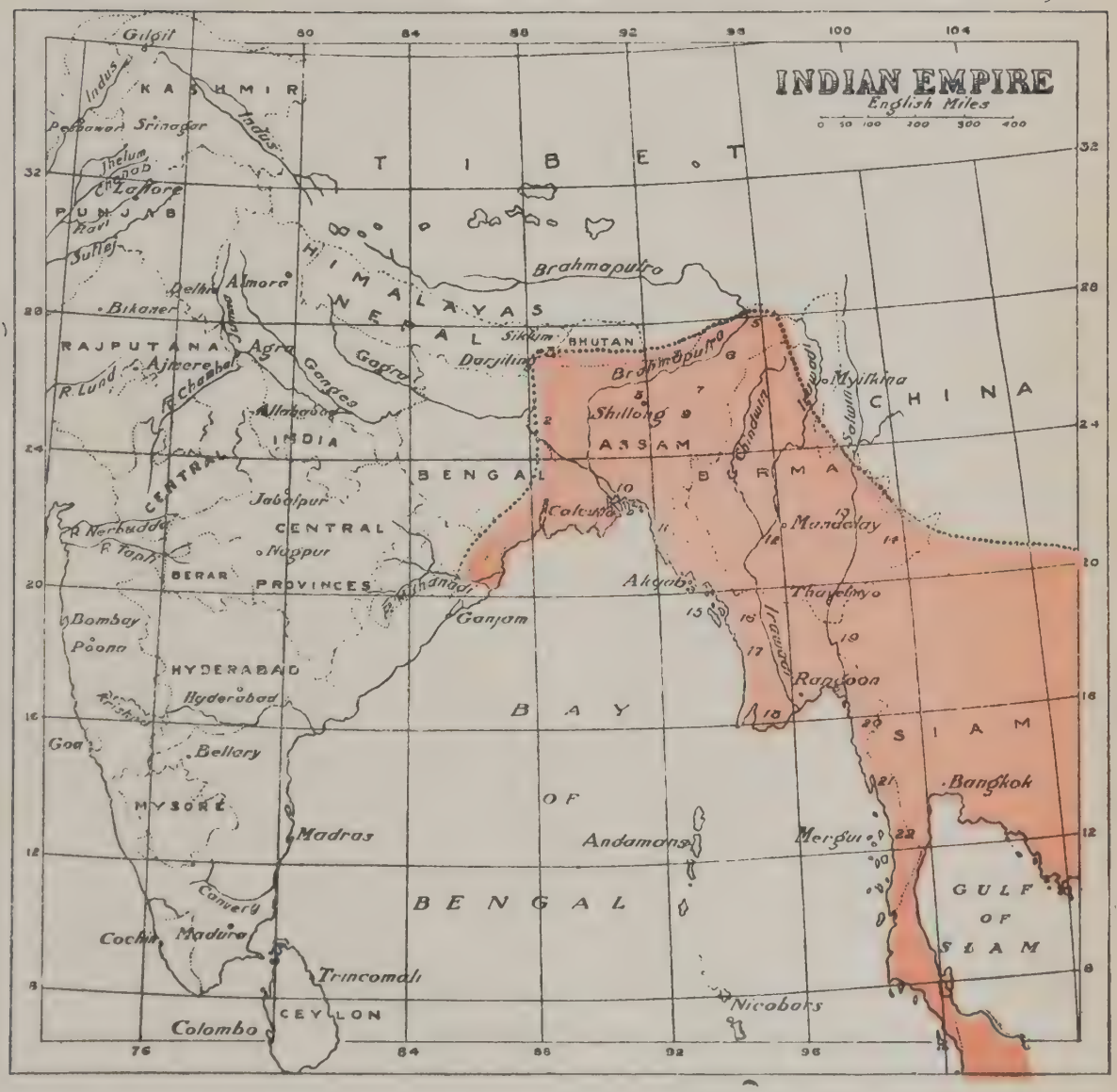
Breeding.—I have had seven gravid females in the months of April, May, June and July. On the 27th April one year in Assam, two were seen playing with one another (flirting), and killed. The female was found to be in an advanced stage of gestation, showing as I have frequently remarked before with other snakes, that conjugal attachment continues for some time after the initial act of mating. The species is not nearly so prolific as many snakes. I never found more than twelve eggs developing in the abdomen, and on one occasion there were only five. Cantor however records one with twenty-three eggs. The largest eggs I measured were $2\frac{1}{16}$ inches long.

Growth.—Having had so few small specimens I am unable to estimate the annual growth.

Parasites.—In one specimen killed in water I found two leeches in the mouth. I have frequently found in the abdomen small white parasites, which were pronounced larval forms of a tapeworm of the genus Pterocercus by Professor Von Linstow.

Distribution.—Bengal, Eastern Himalayas, Assam, Burma, Siam, Cochin-China, South China, Malay Peninsula, Sumatra and Java.

Distribution of Coluber radiatus.



..... limits of distribution uncertain.

1 Cuttack (Annandale), 2 Buxa Dooars (F. W.), 3 Darjeeling District (B. M. & F. W.), 4 Dibrugarh District (F. W.), 5 Sadiya (F. W.), 6 Sibsagar (I. M.), 7 Samaguting (I. M.), 8 Shillong (F. W.), 9 Cachar (I. M.), 10 Bakerganj (Sclater), 11 Chittagong (I. M. & F. W.), 12 Myingyan (Wall and Evans), 13 Mandalay (I. M.), 14 Taomggya (Wall and Evans), Fort Stedman (B. M.), 15 Ramri Island (I. M.), 16 Prome (Wall and Evans), 17 Pegu (I. M.), 18 Rangoon District (Wall and Evans), 19 Toungoo (B. M.), 20 Moulmein (I. M.), 21 Tavoy (I. M.), 22 Mergui (B. M. and I. M.)*

B M. implies British Museum; I. M. Indian Museum; F. W. the author.

* I am almost certain I have seen a young specimen in the Western Himalayas (Ranibagh, Almora District, Circa 2,000 feet). It had its head protruding from a hole in a stone facing, and I stood within two yards of it for a minute or two but failed to catch it. I could see distinctly the bright reddish head, a black transverse occipital stripe, and two black stripes from the eye, the two lower ones typically seen in *radiatus*. As far as I am aware there is no other snake in the Western Himalayas with these distinctive marks.

The accompanying map shows the exact localities known to me from which it has been reported within Indian limits. Essentially a resident in the low country, it finds its way occasionally to considerable altitude. The Rev. C. Leigh obtained it at Kurseong which is about 5,000 feet, and I had one specimen in Shillong (Khasia Hills) at about 4,800 feet.

Its numerical strength may be judged from the following figures. In Burma chiefly around Rangoon Evans and I got 11 specimens out of 615 snakes of all kinds. In Upper Assam out of 615 snakes collected 41 were of this species, and in the Eastern Himalayas below Darjeeling (between 1,200 and 5,200 feet) out of 408 specimens there were 6 copper-headed rat-snakes. In Lower Bengal it is uncommon, if not actually rare.

Lepidosis—Rostral.—Touches 6 shields; the rostro-nasal sutures longest. *Internasals.*—Two; the suture between them half to two-thirds that between the præfrontal fellows, less than the internaso-præfrontals. *Præfrontals.*—Two; the suture between them greater than the præfronto-frontal; in contact with internasal, postnasal, loreal, præocular and supraocular. *Frontal.*—Touches 6 shields; the fronto-supraoculars about twice the fronto-parietals. *Supraoculars.*—Length subequal to frontal, breadth rather less than frontal along a line connecting the centre of the eyes. *Nasals.*—Two; touching 1st and 2nd supralabials. *Loreal.*—One. *Præocular.*—One. *Postoculars.*—Two. *Temporals.*—Two; the lower in contact with 3 supralabials, usually the 6th, 7th and 8th. *Supralabials.*—9 usually the 4th, 5th and 6th, or 5th and 6th only touching the eye (sometimes 8, with the 3rd, 4th and 5th, or 4th and 5th only touching the eye). *Infralabials.*—6 usually (sometimes 7) the 5th and 6th touching the posterior sublinguals; the 6th largest. *Sublinguals.*—Two pairs: subequal in size. *Costals.*—Two heads-lengths behind head 19, midbody 19, two heads-lengths before vent 17. The reduction to 17 occurs shortly behind midbody, and is due to the absorption of the 4th or 5th row above the ventrals. The vertebral row is not enlarged. Keels present. Apical facets present in pairs. *Ventrals.*—Angulate laterally; 224 to 250. *Anal* entire. *Subcaudals.*—Divided; 83 to 106.

Anomalies.—I have seen a small cuneate shield occasionally below the præocular, wedged between the 4th and 5th supralabials. There is a single temporal in rare examples.

Dentition—Maxilla.—21 teeth in an uninterrupted series, subequal in length, the last 3 stouter, and more compressed. *Palatine*—11 to 12, subequal to maxillary. *Pterygoid.*—20 to 21, the anterior subequal to maxillary, reducing in size posteriorly. *Mandibular.*—25 to 27 subequal to maxillary, decreasing in size posteriorly.

Plate.—Our coloured figure leaves nothing to be desired.

Mr. Green's work is excellent. Many specimens, perhaps most, are a brighter shade of ruddy or copper than shown by him.

ZAMENIS DIADEMA (Schlegel).

The Royal Snake.

History.—Like most of our common Indian snakes this species is first referred to by Russell. He gave an excellent figure of it in his Second Volume published in 1801 taken from the larger of two specimens collected at Buchier (Bushire?). Geoffrey in his book on Egyptian snakes appears to be the next to describe and figure it in 1809. Since this most herpetologists treating of Asian snakes have referred to it under various titles. In 1858 Günther placed it in the genus *Zamenis*, and it has remained there since, but I think it is more than likely that it will sooner or later be removed, as it differs in many ways from the type of that genus.

Nomenclature—(*a*) *Scientific.*—The specific name given by Schlegel in 1837 refers to the quoit-like mark on the head of some specimens.

(*b*) *English.*—The Royal Snake seems to me fitting equivalent to the scientific title.

(*c*) *Vernacular.*—Russell gives "chunalee" as the native name in Persia (if I am correct in assuming that Buchier=Bushire). In Rajputana (Jodhpore) Mr. Colan tells me it is called "rājit-bānsār" or "rajitbānsi."

General characters.—The head is a longish oval, well demarcated from the neck. The snout is rather long and moderately obtuse. A largish nostril occupies the upper two-thirds of the suture between the nasal shields. The eye is rather small, its pupil round, and the iris golden, especially towards the pupil. The gold is often tinged brownish, or reddish. The body is compressed, rather stout, and clumsy, and attenuates very noticeably into the neck, and more gradually towards the tail. The belly is slightly angulated each side. The tail is longish, and accounts for rather more than one-fifth, but less than one-fourth the total length.

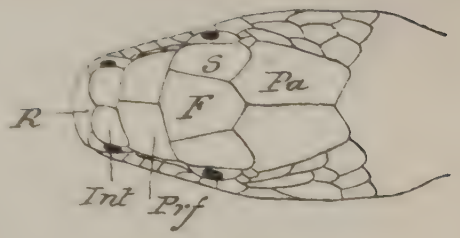
Colouration.—All the young I have seen and from various localities including the Punjab, the N. W. Frontier, Chitral, and Baluchistan conform to one type. They are of a light brown or fawn colour, with three sets of largish, dark dorsal spots. The median may be rounded or rhomboidal in outline, or form short transverse bars and pass down the back from the nape well on to the tail. These marks alternate with the smaller spots of the lateral series. The head is light brown variously spotted, or mottled with darker marks. There is often a band between the eyes, and a quoit-like mark on the parietals (hence the name *diadema*). The latter may be connected with the former by a median stripe, or remain quite detached, or throw back from one to three short

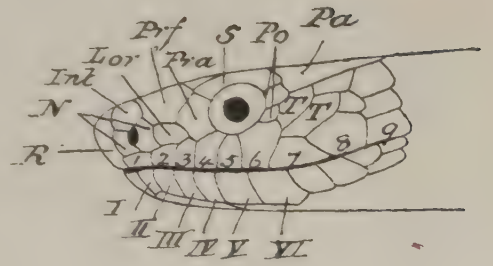
A POPULAR TREATISE ON THE COMMON INDIAN SNAKES.

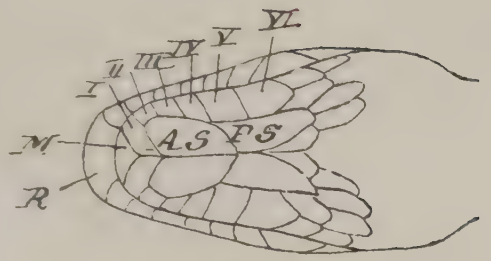
Explanation of Diagram.

COLUBER RADIATUS AND *ZAMENIS DIADEMA.*

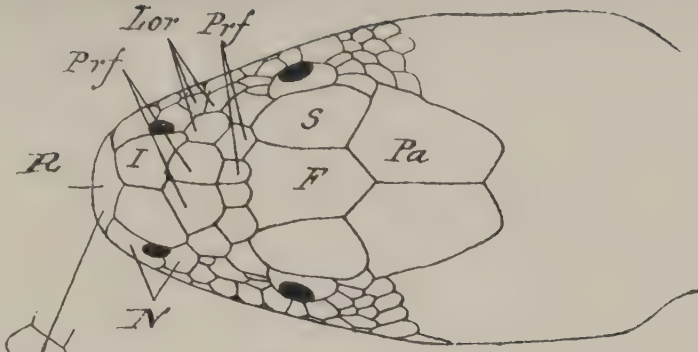
A. S.	Anterior Sublinguals.
F.	Frontal.
Int.	Internasals.
Lor.	Loreals.
M.	Mental.
M. S.	Median Sublinguals.
N.	Nasals.
Pa.	Parietals.
Po.	Postoculars.
Pra.	Præoculars.
Prf.	Præfrontals.
P. S.	Posterior Sublinguals.
R.	Rostral.
S.	Supraocular.
Sl.	Supraloreal.
Su.	Sublingual.
T.	Temporals.
1 to 12	Supralabials.
I to VIII.	Infralabials.

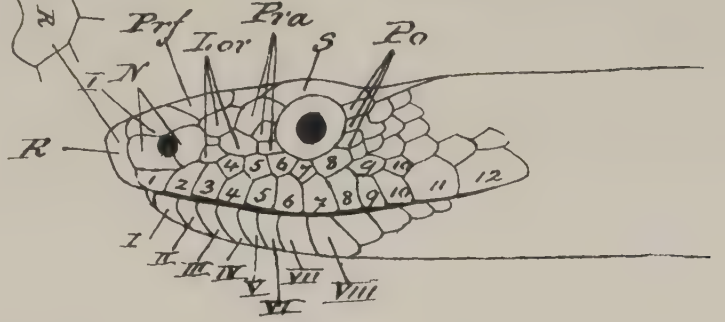


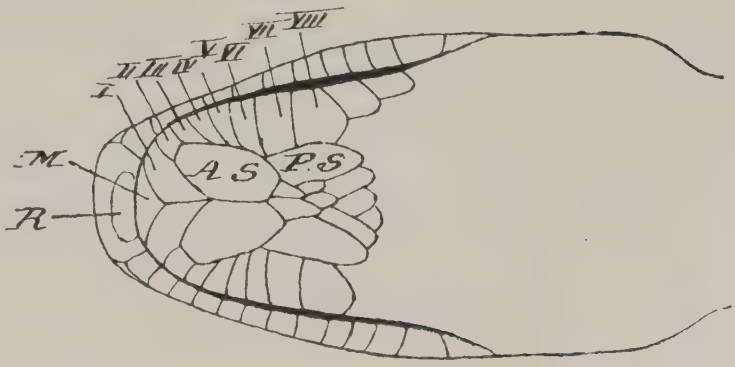




Coluber radiatus $\left(\frac{1}{1}\right)$







Zamenis diadema (circa × 2)

THE COMMON SNAKES OF INDIA.

stripes posteriorly. Many departures from this arrangement may be seen, either towards a confluence, or a disintegration of these marks, and in many specimens the interorbital and diadem marks are not or barely suggested. The belly has been white in all the specimens I have seen. Adults vary very much, but may be grouped thus.

A. Variety *typica.*—This may exactly agree with that seen in the young just referred to. The dorsal marks, and those on the head are often much obscured as age advances, and of course are rendered inconspicuous by impending desquamation. I have sometimes however seen the head marks including the quoit very distinct. Many of these specimens have heads tending towards or quite typical of the next variety. The belly is usually white, but often it is more or less suffused with pink especially in the middle line, and there are frequently greyish spots or mottlings at the sides of the ventrals.

It is a common form—perhaps the commonest—on the N. W. Frontier and in Chitral, and I have seen examples from Sind (Sukkur), Rajputana, the Punjab, and many from Baluchistan, and Aden Hinterland. It is very nicely figured in our Plate (figs. 4, 5 and 6).

B. Variety *atriceps* (Fischer).—This variety is usually much lighter than the last, the prevailing hue being buff, pinkish-buff or pale brownish, getting paler in the flanks which may be citron-yellow. A very few isolated scales in some specimens, many in others, are of a deep claret colour, and there is great irregularity in the disposition of these. Both head and neck are a brilliant strawberry-scarlet, or more often the scarlet on the neck merges into claret colour on the head, or the two hues may be sharply , and more or less irregularly defined. It is to these black headed specimens that Fischer gave the name *atriceps*. The belly is usually a uniform clear rose-pink relieved laterally by darkish mottling or spots. Colonel Light says it is the common variety in Bhuj (Cutch) and Blanford mentions it from Rajputana. I found it common in Delhi and the N. W. Frontier, and have seen specimens from Fatehgarh, Palanpur, Multan, Sind and Baluchistan. It is excellently shown in figures 1, 2 and 3 of our Plate.

In some specimens the dorsal spots as seen in variety *atriceps*, are grouped in such a way as to suggest more or less forcibly the shape and arrangement of the spots seen in variety *typica*, and such specimens are completely intermediate between the two forms. These specimens are unusual, and in all those I have seen the colouration of the head and the belly conforms much more closely to that of *atriceps* than *typica*. I have seen specimens from Baluchistan.

C. Variety *melanoides* (Wall).—In this form the prevailing colour

is black or blackish. In many if one looks closely, one can see darker marks of the same shape and pattern as those characteristic of *typica*. In this peculiarity one is forcibly reminded of the spots one can discern in the coat of a black leopard. In one or two rare cases I have not been able to discern these spots in the snake. I regard these examples as melanotic. The variety is unusual. I have seen specimens from Rajputana (Jodhpore) and Baluchistan.

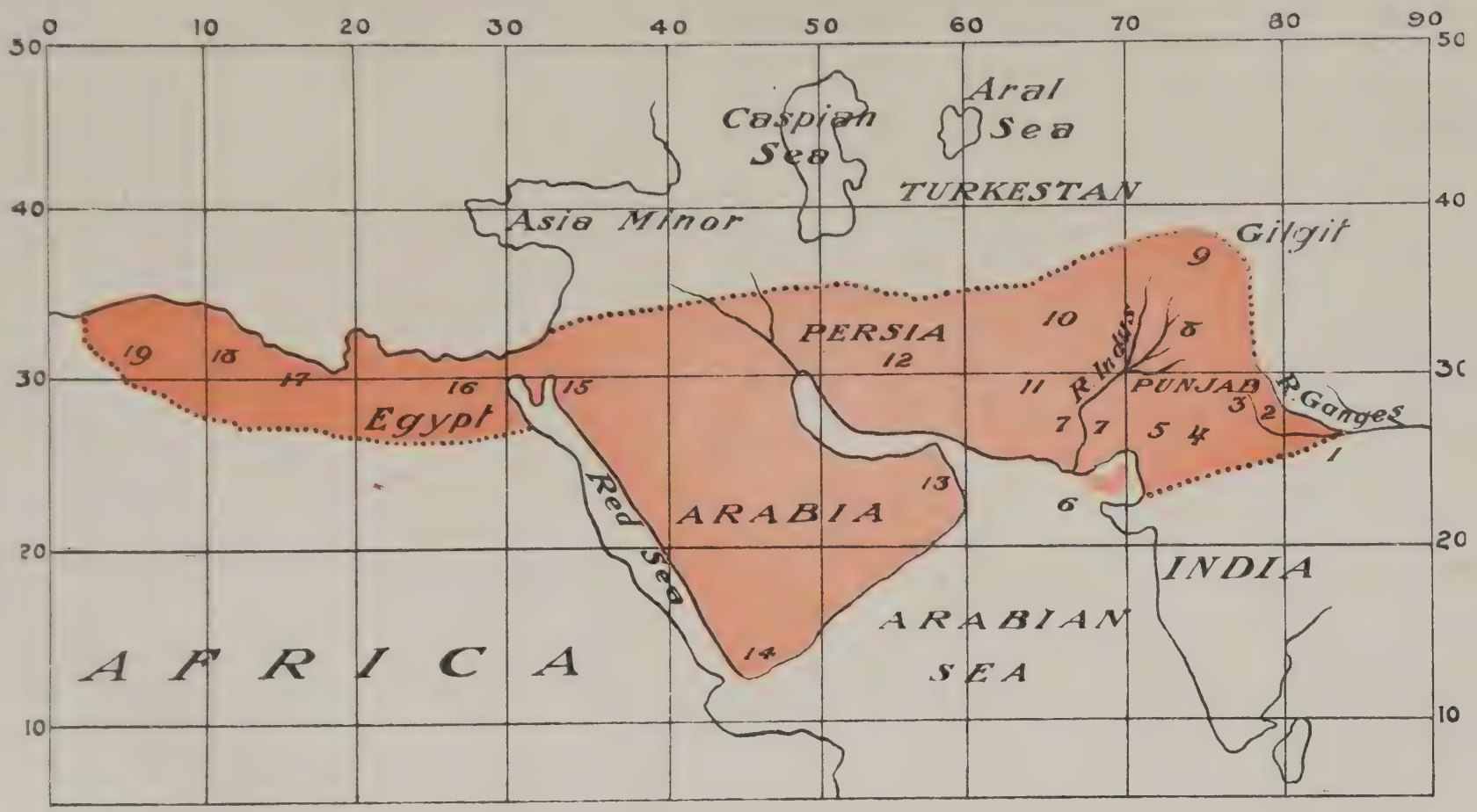
Identification.—Nearly all our Indian snakes that have large head shields, possess a single pair of præfrontal shields (*Vide* the figure of *Coluber radiatus* in this paper).

The Royal Snake is one of the few exceptions to the rule, and in this species a double row of small scales replaces the pair of præfrontals seen in normal head shielding. If the scale rows in midbody number from 25 to 33 (27 to 31 usually) there can be no doubt as to the identity. A very nearly allied species is *Zamenis arenarius*, apparently a very rare snake only known from Rajputana and Sind. In this there is a single row of præfrontals numbering 3 or 4, and the rostral shield is very much larger than in *diadema*. Colonel Light remarks that *diadema* is frequently confused with Russell's viper (*Vipera russelli*) in Cutch. I too have more than once had specimens of variety *typica* sent to me as Russell's viper, the spots and their arrangement being somewhat similar in the two snakes, hence the importance of inspecting the lepidosis.

Dimensions.—The vast majority of adults range between 5 and 6 feet, but Colonel Light has met with several at Bhuj (Cutch) over 6 feet, and one measured 6 feet 7 inches. Mr. Millard received a specimen 6 feet 3 inches from Deesa, and the skin of one sent to our Society from Palanpur with the head deficient measured 7 feet 4½ inches.

Disposition.—I have very little knowledge of the Royal Snake in life. The few specimens I have encountered were in a great hurry to get away and my endeavours were mainly directed to securing the specimen at any cost, which meant that the specimen was killed forthwith. In Delhi a well-known snakeman always had one or more of these snakes in his possession, and they always allowed themselves to be handled without being disagreeable. Mr. Kinnear speaking of one in confinement in our Society's rooms, and recently received through Mr. Colan from Rajputana told me that it was very quiet to handle usually, but on one occasion when he opened the cage "it set up a tremendous hissing, expanding and contracting its body like a cobra." Mr. M. H. Oakes sent me a fine specimen of variety *atriceps* from Fatehgarh, U. P., which his wife found on a shelf among the stores in her godown. It sat up and hissed at her most menacingly and she killed it.

Distribution of Zamenis diadema.



..... limits of distribution uncertain.

LOCALITIES REFERRED TO IN MAP.

(1) Allahabad (I. M.), (2) Fatehgarh (F. W.), (3) Agra (B. M. and I. M.), (4) Rajputana Bhartpore (I. M.), Jaipur (I. M.), Jodhpore (Bo. M.), Ajmer (B. M.), (5) Palanpur (Bo. M.), Deesa (Bo. M.), (6) Cutch (Bo. M.), (7) Sind, Sukkur (F. W.), Kotri (B. M.), Karachi (B. M.), (8) Punjab, Delhi (I. M. and F. W.), Rajanpur (I. M.), Harrand (B. M.), Multan (Bo. M.), Campbellpore (Bo. M.), Lahore (I. M.), (9) N. W. Frontier, Gilgit (I. M. and B. M.), Chitral(I. M. and F. W.), Malakand (F. W.), Bannu (F. W.), (10) Afghanistan (B. M.), (11) Baluchistan (I. M. and B. M.), (12) Persia (I. M. and B. M.), (13) Muscat (B. M.), (14) Aden Hinterland (Bo. M.), (15) Midiax (B. M.), (16) Egypt (B. M.), (17) Tripoli (B. M.), (18) Tunisia (B. M.), (19) Algeria (B. M.)

B. M. implies British Museum ; Bo. M. the Society's Museum ; I. M. Indian Museum ; F. W. the author.

Habits.—I became familiar with the Royal Snake in Chitral. Here the country is very stony, and in clearing the ground for cultivation it is difficult to dispose of the stones. Many are utilised to build walls, which loosely put together encompass every khet. The surplus are thrown into heaps. These walls and heaps furnish attractive quarters for many snakes. but to this species, and the cobra specially. Being loose in their construction there are spacious crevices, and galleries running through them in every direction. The Royal Snake frequently hibernates among these stones, which even in the winter absorb sufficient heat from the sun to offer cosy accommodation. As the year advances, and the sun gets hotter, it is tempted to emerge for a sun bath, and on the least approach of danger precipitately disappears into its stony fastness. It is obviously on this account much more frequently seen than captured. In April 1899 when the Fort at Chakdara was being reconstructed, no fewer than four adult specimens of this snake and two cobras were dislodged while dismantling a few yards of an old masonry wall. One of these had recently fed on a rat, and it seems probable that even in winter retirement a chance meal can sometimes be secured. More than one specimen was killed in the crowded fort at Malakand, and I have known others invade habitations presumably in search of food.

Food.—I have on two occasions known rats eaten, and on one a mouse. Mr. Colan writing from Jodhpore (Rajputana) found one up in a tree shikaring a squirrel.

Breeding.—Though I have seen a large series of freshly killed as well as Museum specimens it is singular that I have never had one gravid female. I can find no mention of one in the literature of this snake. I feel pretty confident that the eggs (presuming that the species is oviparous) are deposited in the hot months, May, June and July. a season when I was at 10,000 ft. in the Hills. The few specimens sent to me during this period were either ♂ ♂, immature ♀ ♀ or specimens too putrified to examine. The length of the hatchling is not known. The smallest specimens I have had were 1 foot $6\frac{1}{2}$ inches and 1 foot $7\frac{1}{4}$ inches in October or November, 1 foot $8\frac{1}{2}$ inches in February, and 1 foot $4\frac{5}{8}$ inches in March. It appears to grow about a foot between the 2nd and 3rd, and 3rd and 4th years of life, and a similar rate of growth in the first year seems to indicate that the hatchling is about fourteen to sixteen inches long. The sexes are very evenly balanced judging from my Chitral records Of 24 sexed, 12 proved to be ♂ ♂, and 12 ♀ ♀. The ♂ claspers are beset with pedunculated cartilaginous processes. The anal glands secrete a material like custard in consistency and colour.

Parasites.—I found many specimens infested with small, oval-shaped, white, parasites which were very numerous in the peritoneum around the coils of the intestine. These were submit-

ted to Professor A. E. Shipley who pronounced them protozoa, probably *Sarcosporidia*, but possibly *myxosporidia*. Among Ectozoa I have seen a tick presumably of the genus *Aponomma*.

Legends.—Mr. Colan tells me that in Rajputana this snake is believed by the natives to be the female cobra.

Distribution.—It occurs in one or other of its varied forms from the United Provinces of India, through Rajputana, Cutch and Sind, the Punjab, the N. W. Frontier of India as far North as Chitral, Baluchistan, Afghanistan, Persia, Arabia, to Northern Africa as far West as Algeria. Its Eastern limit in India is roughly the Ganges. (Allahabad, Fatehgarh.) Its Southern limit in India is roughly a line drawn* from Allahabad to the South of Cutch. The exact localities known to me are shown in the accompanying map.

Lepidosis.—Rostral.—Touches 6 shields, the rostro-nasal sutures subequal to, or greater than the rostro-internasal. *Internasals.*—A pair, the suture between them half or less than half its distance to the frontal; in contact with the uppermost loreal. *Præfrontals.*—Usually in two rows (rarely one or three); from two to three usually in the anterior row, and from three to five in the posterior. *Frontal.*—Touches from 8 to 12 shields; the fronto-supraocular sutures about twice as long as the fronto-parietals. *Supraoculars.*—Length subequal to the frontal; breadth about three-quarters the frontal along a line connecting the centres of the eyes. *Nasals.*—Two, in contact with the 1st and 2nd labials. *Loreal.*—3 to 6. *Præoculars.*—Two or three. *Postoculars.*—Two to three. *Supralabials.*—10 to 13; the 3rd to the 9th or 10th may be divided into an upper and a lower part; usually the upper parts of three, the 5th, 6th and 7th, or the 6th, 7th and 8th, touch the eye†; the last longest. *Infralabials.*—7 or 8, three, usually the 5th, 6th and 7th touch the posterior sublinguals. *Sublinguals.*—Two pairs, the anterior longer, the posterior quite separated by small scales. *Costals.*—Two headslengths behind the head, usually 4 more than in midbody; in midbody usually 29 to 31 (rarely 25 to 33); two heads-lengths before the vent 19 to 21 (rarely 17). The rows increase anteriorly by the division of one of the two uppermost rows (not including the vertebral). They decrease posteriorly by a succession of steps, 5 usually (sometimes 4 or 6). In one of the first three steps, all of which occur close together, the 3rd or the 4th row above the ventrals is absorbed, but in all the other steps (whether 4 or 6) it is one of the two uppermost rows (not including the vertebral) that is absorbed. The vertebrals are not enlarged. Keels are

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* Murray records one from Mahim (Bombay). It is quite possible for such a snake to be transported in cargo from another Port, say Karachi, where it is known to be common.

† Those who regard the upper parts of these shields as suboculars say no supra-labials touch the eye.

present, and apical facets in pairs. *Ventrals.*—210 to 278, angulate. *Anal.*—Entire. *Subcaudals*—65 to 110 divided.

Dentition.—(From four specimens in my collection from Malakand, Chitral, Multan, and Delhi?). *Maxillary.*—16 to 19 uninterrupted, subequal, or the posterior perhaps progressively decreasing in length. *Palatine.*—9 to 10, subequal, and about as long as the maxillary. *Pterygoid.*—15 to 19, slightly decreasing in length anteriorly and posteriorly. *Mandibular.*—20 to 22, the 3rd to about the 7th or 9th subequal, the rest progressively reducing in length posteriorly and anteriorly. The intracranial lining membrane is black, and this colour is more or less visible through the calvarium.

Our Plate is excellent.

NOTES ON SOME NEW AND INTERESTING BUTTERFLIES FROM MANIPUR AND THE NAGA HILLS.

BY

LIEUT.-COL. H. C. TYTLER, 17th INFANTRY.

PART I.

Since writing my notes on "Butterflies from the Naga Hills," published in the Journal of October 31st, 1911, and March 31st, 1912, I have had the good fortune to spend three years at Imphal in the Manipur State, and have endeavoured, with the aid of a large staff of Native collectors, numbering at one time as many as eleven, to systematically work portions of the surrounding hills which are so little known entomologically and also parts of the Naga Hills in the vicinity of Kohima. It is not my intention in these notes to give a full account of the results obtained but only to mention those forms which appear to be new or undescribed, or are otherwise interesting.

I also take this opportunity to describe a few new and interesting forms taken by Captain Porter on the Dihang River in the Abor Hills.

For convenience sake, I have divided the Manipur State into four portions:—

(1) The Manipur Valley, 2,600 feet, which is extensively cultivated with rice and practically devoid of all forest.

(2) The Western Manipur Hills, which lie between the Manipur Valley and Cachar. These hills are covered with dense forest and are crossed by the Cachar Road, a bridle path, leading from Imphal to Silchar in the Cachar Valley. The highest peak is Kabru, 8,400 feet, overlooking the northern end of the Manipur Valley.

(3) The Eastern Manipur Hills, which lie between the Manipur Valley and Burma. These hills are thickly wooded and are crossed towards the south by the Burma Road, a bridle path, leading from Imphal to Tamu in Burma. Towards the north the Ukral Road leads to Ukral, a mission station, about 50 miles from Imphal. Near Ukral, Suroifui is the highest peak being over 9,000 feet; in the vicinity of the Burma Road the hills are much lower, the highest probably not exceeding 6,000 feet.

(4) The Northern Manipur Hills, which adjoin the Naga Hills and connect the Western and Eastern Manipur Hills, are crossed by the main Government cart-road leading from Imphal to Kohima in the Naga Hills. Above Maothana, close to the Naga Hills border, the southern spurs of

Japho Peak, which is just within the Naga Hills, run up to over 9,000 feet.

The parts of Manipur chiefly worked are :—

(1) Imphal itself and the small low hills in its immediate vicinity.
(2) Saitu, a village about 20 miles from Imphal, at the northern end of the valley and situated on the eastern slopes of the Western Manipur Hills.
(3) Kabru Peak, 8,400 feet, situated immediately above Saitu village.
(4) The Irang and Lengba Rivers on the Cachar Road, Western Manipur Hills, about 50 and 60 miles respectively from Imphal.
(5) The country near Sebong, close to the Burma border on the Burma Road, Eastern Manipur Hills, about 64 miles from Imphal.
(6) Suroi village and Suroifui Peak, 9,000 feet, immediately above it about 65 miles from Imphal.

The country worked in the Naga Hills was practically the same as before.

The hill tops, both in Manipur and in the Naga Hills, are very inaccessible. There are practically no paths leading to them through the dense forest, and the Nagas and Manipuris scarcely ever visit them. It was with the greatest difficulty I could induce my Native collectors to go up to them.

Away in the jungles, 134 miles from the nearest Railway Station, the collector is at some disadvantage in properly determining doubtful forms, for want of access to many necessary books of reference and to a good museum. In these notes only those forms have been considered to be new, of which I can find no mention in any of the following books :—

(1) de Nicèville's "Butterflies of India, Burma and Ceylon."
(2) Bingham's "Butterflies," Fauna of British India.
(3) Seitz's "Macrolepidoptera of the World" as far as published.
(4) Elwes and Edward's "Revision of the Oriential Hesperiidæ."
(5) Rothschild and Jordan's Revision of the Papilios of the Eastern Hemisphere.

Since writing the above, I have spent five days at the Calcutta Museum, and together with Capt. W. H. Evans have compared all doubtful forms with specimens in the late Mr. de Nicèville's magnificent collection.

I am indebted to Capt. W. H. Evans for much valuable assistance in determining many doubtful forms. I am also much indebted to this officer and to the Bombay Natural History Society for helping me with collectors; but for their generous assistance much of the ground worked would have remained untouched.

Family—NYMPHALIDÆ.

Sub-family—*Satyrinæ*.

Pararge gafuri, n. sp. (Pl. I, Fig. 1.)

Male and female. *Upperside*: ochreous yellow. Forewing: rather fuscous near base and along costa; apex and terminal border black, the latter tending to form broad contiguous lunules in spaces 1-4, anterior to which is a subterminal row of diffuse blackish patches; discocellulars marked with darker colour; a subapical black ocellus with a white centre in space 5; termen with a fine anteciliary black line inwardly bordered by a broader line of the ground colour. Hindwing: rather fuscous along dorsum becoming more pronounced near tornus; subterminal area paler, inwardly defined by a dark diffuse line, outwardly projected at vein 4, and outwardly bordered by a broad dark row of contiguous spots, followed by a narrow line of the ground colour and a still narrower black anteciliary line; on the subterminal pale area are five black spots in spaces 1, 2, 3, 5 and 6, the last three spots blind and subequal, the one in space 2 the largest and white centred, and the one in space 1 the smallest and also white centred.

Underside: Both wings clearer yellow than above. Forewing: discocellular marked with darker yellow; a subterminal pale silvery lilac band, ending in a black ocellus ringed with yellow and centred with bluish-white in space 5, bordered inwardly and outwardly by darker yellow; the inner border recurving sharply back at right angles in space 4 till it reaches vein 9; the outer border followed by a narrow pale lilac line, a still narrower black line, a broader line of the ground colour and lastly by a very narrow anteciliary thread. Hindwing: discocellulars marked with darker yellow; a subterminal pale silvery lilac band with black spots ringed with yellow and centred with white in spaces 1, 2 and 6; the tornal spot small, the other two large and subequal, this band inwardly bordered by a dark yellow line which projects outwardly at vein 4 and outwardly bordered by a similarly coloured line followed by a narrow silvery lilac line, a still narrower black line, a broader line of the ground colour and lastly by a fine anteciliary line as in forewing. The *female* only differs in being somewhat paler and larger than the male.

Cilia blackish; body brown above, white below. Antennæ: *above* blackish-ringed with white and tipped with ochreous; *below* brownish-ochre near base turning to ochreous near club which is black.

Expanse: ♂ ♂ 2·37″—2·65″; ♀ ♀ 2·54″—2·82″.

It agrees with *P. cashmirensis*, Moore, in venation and in having the eyes hairy but the shape of the wings is very different. It is very like *Lethe gemina*, Leech, except for colour which is brown in the latter species. Described from a large series of males and eleven females taken at Kirbari, Naga Hills, 6,000-7,000 feet, between the end of July and beginning of October. Specimens taken in July and August were fresh and in good condition, and those in September and October were worn and damaged.

Callerebia suroia, n. sp. (Pl. I, Fig. 2 ♂).

Male and female. *Upperside*: dark velvety brown rather paler in the female. Forewing: terminal area paler and sprinkled with greyish scales; a large bipupilled black ocellus broadly ringed with orange which is outwardly paler and bordered by a dark subterminal line. Hindwing: a subterminal obscure dark narrow line; a single black tornal ocellus centred with white and ringed with fulvous, very often wanting in males. *Underside*: forewing: brown tinged with red in cell; apical half of costa striated with white;

terminal area rather paler ; a large bipupilled black ocellus, broadly ringed with orange and outwardly margined with black as on upperside ; below the ocellus and on its inner margin the ground colour is somewhat darker. Hindwing : brown densely irrorated with short white strigæ which become more intense and conspicuous along the dorsum and postmedian area ; a dark reddish-brown sub-basal band followed by a median band of the same colour strongly outwardly angled at vein 5 commencing at the costa and reaching vein 1 just above the tornus ; terminal area broadly brown, faintly striated with white.

Cilia brown, inner hairs white forming a conspicuous white line along the termen.

Expanse : ♂♂ 2·2″—2·7″; ♀♀ 2·59″—2·7″; very similar in appearance to *C. orixa*, Moore, from which it can be distinguished on the upperside forewing, by the very much broader orange ring round the ocellus especially on its outer edge. *Underneath* by the broader orange ring on the forewing and on the hindwing by the two very conspicuous sub-basal and median reddish-brown bands which are almost obsolete in *C. orixa* ; by the denser and more conspicuous white strigæ and by the complete absence of the tornal ocellus.

Described from four males taken near Suroi, 6,000 feet, in July by Captain Evans' and my own collectors and from nine males and seven females taken at the same place by my collectors in August. Specimens taken in July were quite fresh and those in August were worn and in bad condition.

LETHE NAGA, Doherty.

The *male* which has not been described only differs from the *female* in lacking the discal white band on the forewing and on the *upperside* all the ocelli are *usually* blind. In rainy-season forms the *apical* ocellus of forewing is sometimes minutely centred with white. Dry-season forms have the *two upper ocelli* on forewing sometimes centred with white and on the hindwing the ocelli in spaces 2, 4 and 5 are sometimes similarly minutely pupilled. On the *underside* the basal half of forewing and the whole of the hindwing is darker brown ; the apical half of the forewing being tinged with violet. In dry-season forms which are smaller the white band of the female is faintly indicated on the underside by the ground colour being slightly paler. *Females* have on both sides of the forewing the white band at the costal end inwardly produced towards the base ; and in the single *fresh* specimen before me all the ocelli on the upper forewing and hindwing with the exception of the costal and tornal ones of the hindwing are minutely centred with white, in three other worn females some of these white pupils are obliterated probably through wear.

Expanse : *d. s.* ♂♂ 2·74″—2·9″; *w. s.* ♂♂ 2·97″—3·23″. Capt. Evans and my collectors took several males and a few females of the wet-season form on the Burma Road, Manipur, near the Burma border at low elevations from September to December ; nearly all the specimens taken during November and December were badly worn. Dry-season forms were obtained at the same place in June.

This is a very interesting capture as I believe this species has hitherto been known only by a single female, taken by Doherty at Margherita in the Assam Valley.

It is closely related to *Lethe philemon*, Fruhstorfer, from Northern Tonkin and is probably conspecific as stated by Fruhstorfer.

LETHE SERBONIS NAGANUM, n. sp.

Under the above name I propose separating the form of *L. serbonis* from the Manipur and Naga Hills from the typical form from Sikkim. It is a well marked race and differs from typical *serbonis* in being much larger, *viz.*,

3"—3·29" against 2·5" — 2·75" as recorded by Bingham and 2·9" as recorded by de Nicèville.

Male. *Upperside*: much darker. Forewing: the post-discal area less conspicuously paler than rest of the wing. *Underside*: much darker; markings dark red-brown and not light red-brown as in the typical form.

Female. Very similar to the male and only differs on the *upperside* in having the post-discal dark band more conspicuous and the area beyond it paler; the costal and preapical spots more conspicuous. *Underside*: brighter and more golden brown.

Both sexes taken during August and September on Kabru Peak, Manipur, 7,000′ — 8,400′ and males in the Naga Hills at Kirbari, Takabama, and on the Hill above Kohima at about 7,000′ during the same months.

Although I have obtained a good series of both sexes it is by no means a common butterfly and appears to be on the wing only in August and September.

Lethe satyavati, de N.

A female of the dry-season form was obtained on the Barak River, Western Manipur Hills, in April.

The ♀ type in the de Nicéville collection caught on May 18th is a *wet-season form*. The *dry-season form* differs from it on the *upperside* in being greyish-brown and not red-brown and in having the whitish terminal area much more conspicuous. *Underneath* the colour is also greyish-brown and not red-brown and the pale terminal area not so distinctly lilacine and the ocelli not so large.

This is an exceedingly interesting capture as the two type specimens, taken by Professor Wood-Mason at Sibsagar, have hitherto been the only ones recorded. The male still remains unknown.

Lethe siderea, Marshall.

The *female* which according to Bingham is unknown differs somewhat from the male. *Upperside*: paler brown than the male. Forewing: cell and bases of interspaces 3, 4, 5 and 6 darker than the rest of the wing; this dark area outwardly well defined and sharply angled at vein 4, followed by a pale brown transverse band; a preapical row of pale spots in interspaces 4 — 6 and a diffused pale area in interspaces 7 and 8. Hindwing: the ocelli on underside showing through more or less as dark spots. *Underside*. Forewing: the dark discal area sharply defined as on upperside but continued into interspace 2; the transverse pale brown post-discal band as on upperside but very diffuse on outer edge, followed by a preapical row of white spots in interspaces 3 — 7, the lower spot sometimes absent; base of interspaces 7 and 8 pale brown.

Hindwing as in male.

Expanse: ♀ ♀ 2·15"—2·23."

Both sexes were obtained by my Native Collectors at 6,000′—8,400′ from May to October, both in the Naga Hills and in Manipur. Females were generally found higher up than the males.

It is by no means such a rare insect as I previously thought.

Lethe kanjupkula, n. sp. (Pl. I, Figs. 5, 6; ♂, ♀).

Male, *dry-season form*. *Upperside*: very similar to *L. siderea* in shape of wings but the colour is greenish-brown and not coppery-brown as in that species. Forewing unmarked. Hindwing four faint dark spots in interspaces 2—5. *Underside*: dark fuliginous brown. Forewing; a faint much curved post-discal band, lighter than the ground colour, commencing at the costa just beyond apex of the cell and ending at the tornal angle. Three sub-apical dark spots with blurred whitish centres in interspaces

4—6; a fourth spot in interspace 3 indicated by a minute white dot; a whitish spot at base of interspace 7 above which is another spot in interspace 8 and below it are two spots in interspace 6 anterior to the dark subterminal spot before mentioned; a fine black terminal line inwardly defined by whitish streaks in interspaces 2—5 and outwardly defined by ochreous brown which extends to the apical area. Hindwing: the following lilacine highly irregular and broken bands crossing the basal half of wing; *viz.*, a very short basal; two short sub-basal; another just before end of cell and another just beyond the cell, broken at interspaces 2 and 3, filling the base of the former but not entering the latter; these last two bands bordered by dark brown anteriorly and posteriorly respectively and joined together by two fine lilacine lines on either side of the discocellulars; a subterminal row of six black white centred spots encircled with yellow and an outer ring of lilacine; the tornal spot bipupilled and those in interspaces 3 and 4 blurred. A terminal black line outwardly bordered by yellowish-brown and inwardly by lilacine lunules. Antennæ: *above* brown: *below* ringed with white; apex reddish.

The *wet-season male* only differs in being richer brown above and all the markings below brighter lilacine.

Female, *wet-season form*. *Upperside*: paler than male. Forewing: a postdiscal rather indistinct yellow macular band, commencing at the costa just above the apex of the cell and directed, as far as interspace 4, towards the middle of the termen and then sharply bent down towards the tornus inwardly bordered with dark brown; two pale yellow preapical spots in interspaces 4 and 5 above which are three yellowish subcostal streaks. Hindwing as in male, but spots rather more distinct and faintly encircled with dusky yellow; subterminal area darker brown; a distinct ochreous narrow terminal line. *Underside*: paler than the male. Forewing: yellow postdiscal band as on upperside but broader and much more distinct, inwardly broadly bordered with dark brown; apical area paler than in the male; subterminal spots as in male, but spot in interspace 3 placed on the postdiscal yellow macular band and so very indistinct. Hindwing as in male, but basal half irrorated with violet scales; subterminal spots more conspicuously surrounded by lilacine towards the apex; a postdiscal yellow band between the subterminal spots and the discal dark brown band, most conspicuous in interspaces 2—4; subterminal area near tornus red-brown.

Expanse: ♂♂ 2″—2·3″; ♀♀ 2·37″—2·52″. The *female* is very like that sex of *L. nicetas*; the termen is somewhat rounder and on the *upperside* of the forewing the discal macular band is not quite so conspicuous. On the hindwing the spots are rather more distinct. On the *underside* the yellow postdiscal macular band is not so broad and the basal half of the hindwing is not so densely irrorated with violet scales; the subterminal ocelli are also larger. It can always be easily distinguished from ♀ *L. nicetas* by the shape of the yellow postdiscal macular band on the forewing, above and below, which in the present form commences at the costa nearer to the apex of the cell and is directed, as far as interspace 4, towards a point on the termen nearer the apex than it is in *L. nicetas*; the shape consequently appearing very different.

It belongs to the *Sinchula* group and its nearest allies appear to be *L. siderea* and *L. nicetas*.

The type, a dry-season male, was taken at Kanjupkul on the western edge of the Manipur Valley at 6,000 ft. on 4th June; another *d. s.* male was taken on Kabru, Manipur, at 8,400 ft. during the same month and three more males at the same place in July. Nine males and five females of the wet-season form were taken in the Zulla valley, Naga Hills, at about 6,000 ft. in October and the beginning of November.

LETHE NICETAS, Hewitson.

Numerous specimens of both sexes were obtained by my native collectors on Kabru Peak, Manipur, at 8,400 ft. during May and June and again in August and September. It is double brooded. I believe it has not previously been recorded East of Sikkim.

LETHE VISRAVA, Moore.

A single wet-season male taken on the Burma Road, Manipur, in October and two dry-season males taken at the same place in June. Not previously recorded East of Bhutan I believe.

LETHE LYNCUS, de N.

A single male obtained on Suroifui, Eastern Manipur Hills, 8,000 ft. to 9,000 ft. in August which agrees exactly with a specimen in the de Nicéville collection as regards markings but which has the forewing rather more pointed and the colour underneath much browner. It may prove to be a well defined race of *L. lyncus* but I do not like to separate it on a single specimen. *L. lyncus* in Sikkim appears to be very rare and its occurrence in Manipur is interesting.

LETHE KABRUA, n. sp. (Pl. I, Fig. 7, ♂).

Very similar in appearance to *L. jalaurida*, from Sikkim, from which it differs in the following respects:—

Male. *Upperside:* forewing: similar to *L. jalaurida*, but with a conspicuous sexual brand of specialized scales from near base of vein 4 to the middle of vein 1, straight on inner edge and crenated on the outer edge between the veins. Hindwing: ocelli placed on a ground of similar colour to the rest of the wing and not on a pale area as in *L. jalaurida*, otherwise similar. *Upperside:* forewing: similar to *L. jalaurida*, but ocelli in interspaces 4 and 5, merely indicated by white specks; that in interspace 6 wanting in this respect, resembling *L. moelleri*. Hindwing: very similar to *L. jalaurida*, but basal line wanting; the sub-basal line not well defined and distinctly violaceous; the discal transverse band duller and much broader; ocellus in interspace 4 equal in size to those in interspaces 5 and 6 and not smaller as in *L. jalaurida*.

Female. *Upperside*: similar to male, but wanting the sexual brand on forewing: *Underside*: the ground colour tinged with ochraceous; otherwise similar.

Expanse: ♂ ♂ 2·18″—2·3″; ♀ ♀ 2·26″—2·5″.

A large number of males and a fair series of females taken on Kabru Peak 8,400 feet, in June, July and August. The females are very much rarer than the males.

BLANAIDA ARMANDII, Oberthur.

Satyrus armandii, Oberthur, Et. Ent. ii, p. 26, t. 11·5 ♂ (1876).
Neope khasiana, Moore, Trans. Ent. Soc., 1881, p. 306.
Neope khasiana, de Nicèville, Butt. Ind. i., p. 172.
Neope bhadra khasiana, Seitz, Macrolepidoptera of the World, vol. X, p. 325, 1911.
Lethe khasiana, Tytler, J. B. N. H. S., vol. xxi, p. 53.
Blanaida bhadra = khasiana, Evans, J. B. N. H. S., vol. xxi, p. 566.

There has hitherto been some confusion as regards *Blanaida khasiana*, Moore, which has been considered by some authors to be a separate species and by others merely a seasonal form of *B. bhadra*. It is however undoubtedly the *dry-season form* of *B. armandii*, which is the *wet-season*

form. Elwes was right when he considered *khasiana* to be a synonym of *armandii*, although he did not obtain the two seasonal forms from the same locality, he obtained two specimens of the *d. s. f.* = *khasiana* from the Naga Hills and a single *w. s. f.* = *armandii* from Bernardmyo, Burma, taken by Doherty. These according to Mr. Elwes only differed from one another in the colour of the hindwing and agreed exactly with typical *armandii* from China in Leech's collection, in which both forms from the same locality were represented.

On the *upperside* the wet-season form has all the markings uniformly pale yellow and the ground colour of the outer half of the hindwing is concolorous with the basal half; whereas in the dry-season form it is nearly entirely bright yellow. On the forewing of the dry-season form the spot beyond the cell in interspace 3 and the apical spots have a tendency to become white, the former in the male being small and narrowly oval in shape, whereas in the wet-season form it is much rounder and larger. *Underside:* the dry-season form has all the white markings broader and on the hindwing the outer half is ochraceous, whereas in the wet-season form it is pure light brown. The dry-season forms of *armandii* and *bhadra* are somewhat alike above, but below the markings are very different. Both seasonal forms of *armandii* can at once be distinguished from those of *bhadra* by the characteristic markings in the cell on the *underside* of the forewing; in *bhadra* the central pale band in the cell is *more or less straight*, whereas in *armandii* it is *sharply bent back* at its middle *at right angles* to base of vein 2. Again in *armandii* the ground colour underneath is pure brown, whereas in *bhadra* it is more or less washed with lilac.

Rare in Manipur where only a few specimens of the wet-season form were obtained below Kabru Peak at about 7,500 feet in May. Fairly common in the Naga Hills where numerous specimens of the wet-season form were obtained at Jakama, Kohima, Takabama and Kirbari at 6,000-7,500 feet during August and September. In September the dry-season form emerges and eleven males were taken during that month at Kirbari. A single fresh *dry-season female* was obtained at the same place in *June*. There are therefore two broods for certain: (1) a summer brood of the wet-season form flying from May to September, an occasional worn specimen struggling on till October; (2) an autumn brood of the dry-season form emerging in September and probably flying into October and November. The occurrence of the *dry-season* female taken in *June* is difficult to explain. The females are exceedingly rare, and only three were obtained.

Mycalesis adamsonii, Watson.

The dry-season form only appears to have been described. Both Watson and Bingham mention that there are five ocelli on the forewing underneath. In the numerous specimens of the *d. s. f.* that I have examined, I have only come across one with all five complete, the ocellus in interspace 3 being generally wanting. The ocelli on the hindwing are not always perfectly formed, the inner ones being often merely indicated by white specks.

The *wet-season form* differs considerably on the *underside*. The outer pale area is not nearly so conspicuous and is washed with lilac brown. The forewing has three perfect ocelli in interspaces 2, 5 and 6, those in interspaces 3 and 4 being completely wanting. On the hindwing all seven ocelli are perfectly formed and larger.

This species has hitherto been considered to be very rare, but it is common in the Manipur Valley, at the foot of the Range Hills, where I took numerous specimens of both seasonal forms. In other parts of Manipur it is much rarer and only a few specimens were occasionally obtained at Kanglatombi

at the extreme northern extremity of the valley and at Sebong on the Burma border.

The *d. s. f.* flies in March and April and again in November, and the *w. s. f.* from June to November.

MYCALESIS ALBOFASCIATA, n. sp. (Pl. II, Fig. 14 ♂).

Wet-season form: Male: *upperside*: dull brown. Forewing with a large ocellus in interspace 2 almost reaching the middle of interspaces 1 and 3; a smaller one in interspace 5, both black with white centres and outer fulvous rings. A glandular patch of raised scales at the middle of vein 1, partially covered by a pencil of long black hairs on either side of that vein. Hindwing plain brown; ocelli on underside sometimes faintly showing through. A glandular patch of scales near the base of vein 7, overlapped by a tuft of whitish hairs originating near the base of the cell. *Underside*: pale yellowish-grey-brown. Both wings: a double sub-basal rather indistinct brown line crossing the middle of the cell of the forewing and continued across the hindwing as far as vein 1, as a single irregular line; a narrow whitish postdiscal band inwardly well defined and bordered by dark brown and outwardly diffuse; a terminal and sub-terminal pale brown line, the latter being very sinuous. Forewing with a glandular patch of dark scales on a nacreous area near base of vein 1; ocelli as on upperside but very much smaller. Hindwing: seven rather small ocelli; the one in interspace 2, the largest those in interspaces 5 and 6 minute.

Female: very similar to the male but larger. Ocelli on *upper* forewing larger than in the male. Hindwing: *upperside* with one or two ocelli generally present and well-defined. *Underside*: similar to male.

Dry-season form: *upperside*: similar to the wet-season form. *Underside*: basal two-thirds, rather darker than outer third; all the ocelli much smaller and indistinct.

Expanse: ♂ ♂ 1·92″—2·12″; ♀ ♀ 2·15″—2·25″.

This species which belongs to the *Gareris* group is closely allied to *M. sanatana* from which it can however be easily distinguished by the following differences:—

(1) Ocelli on *upperside* larger.
(2) *Underside*: pale yellowish-brown and not dark-brown as in *sanatana*.
(3) *Underside*: postdiscal band not tinged with violet.
(4) *Upperside, h. w.*: the basal tuft of hairs whitish: in *sanatana* it is yellowish-brown.

The genitalia also differ considerably—

(1) The clasps are longer and somewhat thinner.
(2) The hooks are much longer.
(3) The tegumen is not so stout and ends in a much longer and narrower hook.

There are two specimens of this form from the Naga Hills, in the British Museum over the label of *M. sanatana*.

M. sanatana and *M. albofasciata* do not fly together: the former is found from the foot of the hills up to 5,000 feet and the latter from 6,000 feet to 8,000 feet.

It is common in the Naga Hills. Four *d. s. f.* males were obtained at Phesima in April and many west-season forms of both sexes at Phesima, Kohima, Takabama and in the Zulla Valley from July to October. It also occurs at Mao, Manipur, on the Naga Hills border.

MYCALESIS EVANSII, n. sp. (Pl. I, Fig. 8, ♂; Fig. 9, ♀).

Wet-season form. Male: *Upperside*. dull brown. Forewing with a large black ocellus, with white centre and an outer fulvous ring, in interspace 2

extending into interspaces 1 and 3; a similar very small preapical ocellus sometimes present; the pale postdiscal band of underside faintly indicated. Hindwing: uniformly brown, the ocelli on underside sometimes faintly showing through in interspaces 1, 2 and 3. *Underside* paler-brown. Both wings: a sub-basal dark line; a postdiscal yellowish-white broad band inwardly defined with dark-brown; a subterminal and anteciliary dark line, the ground colour on either side of the first being suffused with violet and between the latter two with yellow. Forewing with a large black ocellus, white centred and fulvous ringed, in interspace 2 extending into interspaces 1 and 2; a similar but smaller ocellus in interspace 5; sometimes two minute ocelli in interspaces 3 and 4 attached to those in 2 and 5. Hindwing with 7 ocelli; that in interspace 2 the largest: that in interspace 6 rather smaller; that in interspace 3 and the upper one in interspace 1 smaller and subequal; those in interspaces 5 and 6 and the lower one in interspace 1 minute; all the ocelli as in forewing black with white centres and outer fulvous rings and nearly in a straight line. ♂ mark on *underside* of forewing *not visible* on the nacreous area. A basal tuft of yellowish-white hairs on upper hindwing covering a glandular patch of dark brown specialized scales.

The *female* only differs from the male in the *upperside* being paler and in the ocellus on the forewing being larger.

The *dry-season form* differs from the *wet-season form* in having on the upperside one small preapical ocellus on the forewing generally present and two ocelli in interspaces 2 and 3 of the hindwing occasionally present in the male, nearly always so in the female. *Underside*: All the ocelli smaller: those in interspaces 3 and 4 of the forewing always present and separate and never touching those in interspaces 2 and 5 as in the *w. s. f.* when present. Terminal and sub-terminal lines narrower and paler: sub-terminal area paler and yellower.

Expanse: ♂ ♂ 1·7″—1·9″; ♀ ♀ 1·93″—2·12.″

This species which belongs to the *Calysisme* group is common in the Manipur Valley where numerous specimens of the *d. s. f.* were taken in April. The *w. s. f.* emerges in June when it is common and flies till October becoming scarcer as the season advances. A few specimens were taken at the extreme northern end of the valley at 4,000 feet, where the road crosses over the watershed between the Imphal and Barak Rivers. All the other specimens were taken in Imphal itself, mostly in thick scrub jungle.

Mycalesis misenus, de Nicéville.

The *wet-season form* only of this species appears to have been recorded. Mr. de Nicéville figured a form taken in April and May, *i.e., the dry-season*, which agreed with *wet-season forms* and he was of the opinion that only *one* form of this species existed. The *dry-season form*, however, is quite different and differs from the wet-season form just as the *d. s. f.* of *M. nicotia* (= *langi* de N.) does from its *w. s. f., i.e.*, in having all the ocelli on the underside much reduced in size. The sub-terminal area on which these ocelli are placed is also conspicuously paler. On the upperside forewing the sub-terminal area is also somewhat paler especially so in females.

Eleven ♂ ♂ and six ♀ ♀ of the *d. s. f.* were obtained near Sebong, Manipur, on the Burma border, at low elevations in March and April; and a single female during the latter month on the Lengba River, Cachar Road, Manipur; a single female of the *w. s. f.* was also obtained at the same place in July.

I believe this species has hitherto not been recorded further east than the Khasi Hills.

MYCALESIS LEPCHA KOHIMENSIS n. sp. .

The form of *lepcha* occurring in the Naga Hills and Manipur is sufficiently distinct from the typical form to be worth separating, and I propose the above name for it. The *w. s. f.* differs in the following respects; the *d. s. f.* is almost identical: —

(1) *Upperside*: white band more distinct, intermediate between typical *lepcha* and *M. malsara*.
(2) *Underside*: ground colour pure brown with no tinge of red.
(3) Ocelli on *underside* of forewing in a line with the exception of the apical one which is bent inwards; in *lepcha* the ocelli in interspaces 3 and 4 are *bent inwards*.
(4) Discal band on *underside* broader, especially near the costa of the forewing, whereas in typical *lepcha* it is very narrow.
(5) Cilia *grey* or *whitish*; conspicuously so in males. In typical *lepcha* they are *brown*.

It is worthy of note that in the *d. s. f.* the *cilia* are *brown*.

Fairly common in Manipur and the Naga Hills at 4,500 feet and upwards during the rains. In the spring the *d. s. f.* flies at about 2,000 feet.

There has been some confusion about the three closely allied forms—*M. malsara*, Moore, *M. lepcha*, Moore, and *M. watsoni*, Evans. *M. malsara* and *M. lepcha* have been considered by some authors as representing different species and by others as races of one another. *M. watsoni* has only recently been separated and was placed by Evans as a race of *M. lepcha*. Watson probably took all three forms in the Chin Hills but could find no constant character by which to separate *M. malsara* from *M. lepcha* and recorded both forms under the name of *M. malsara* (J. B. N. H. Soc., vol. x., p. 642). All three forms occur in Manipur and in the Naga Hills. In the rains *M. lepcha kohimensis* flies at 4,500—7,000 feet, but descends in the dry weather to 2,000 feet; *M. malsara* and *M. watsoni* fly from the foot of the hills up to about 3,000 feet.

I have no doubt whatever that all three forms are perfectly distinct and good species.

In closely allied forms, where the facies are somewhat similar, the safest guide is an examination of the genitalia. Fortunately the genitalia of these three forms are all very distinct from one another.

M. malsara has the apical half of the clasp rather stout and the apex square and coarsely serrated. Hooks short and stout.

M. watsoni has the apical half of the clasp also rather stout, but the apex is conspicuously hollowed out in the middle forming two rounded projections on either side, and finely serrated. Hooks longer and thinner.

M. lepcha kohimensis has the apical half of the clasp longer and much narrower; the apex rounded and very finely serrated. Hooks long and thin as in *M. watsoni*. The tegumen in all three forms also varies in shape slightly.

In the few specimens of typical *M. lepcha* from the N. W. Himalayas that I have examined the apex of the clasp appears slightly squarer, but otherwise there is no difference in the genitalia and there is no doubt that the form *kohimensis* is a race of *lepcha*.

MYCALESIS MNASICLES PERNA, Fruhst.

A male and three females taken near Sebong, Manipur, in November and April. I believe this species has previously been only recorded from S. Burma and Tenasserim and from the Salwin River, Upper Burma.

MYCALESIS MYSTES, de N.

A large series of males and females taken near Sebong, Manipur, in March and April. It appears to be very local.

ELYMNIAS PEALII, W. M.

A few specimens of both sexes of this rare butterfly were obtained on the Irang River, Western Manipur Hills, and at Sebong, Manipur Hills, in March and April, and again in September and October. A pair was obtained at Nichuguard, Naga Hills, in March, and a male at the same place in April. This species has hitherto only been recorded from Upper Assam.

ELYMNIAS PENANGA CHELENSIS, de N.

A few specimens were obtained on the Irang River, Western Manipur Hills, in February and in October.

THAURIA ALIRIS INTERMEDIA, Crowley.

A large series of both sexes of this beautiful butterfly was obtained at Sebong, at the foot of the Eastern Manipur Hills, in March and April and a few damaged specimens in May.

STICOPHTHALMA NOURMAHAL, Westwood.

A large series of both sexes was obtained at Kirbari, Naga Hills, at 6,000 feet during July, August and September; during the latter month, however, most of the specimens were worn and damaged. The ♀♀ remain in good condition much longer than the ♂♂ which soon knock themselves to pieces flying up and down dense shady bamboo-clad nullahs. A few specimens were also taken at Takabama, 28 miles east of Kohima, in August.

Although not rare, it appears to be extremely local.

This species has hitherto only been recorded from Sikkim, where it is extremely rare.

STICOPHTHALMA SPARTA, de N.

Several males and two females, possibly dry-season forms, were obtained by Capt. Evans and my Native collectors at Sebong, Eastern Manipur Hills, from the end of April to the beginning of June.

The type of *S. sparta* is in the de Nicéville collection in the Indian Museum, Calcutta, where I had an opportunity of examining it. The original figure in the J. A. S. B., vol. 43, is very good excepting that on the upperside the apical area of the forewing is not pale enough. The type is either *aberrant* on an *extreme wet-season form*. Mr. de Nicéville bought it from a Telegraph Signaller employed at Manipur, and the exact locality and date of capture are not known.

The males taken by Capt. Evans and my collectors are somewhat larger than the type and differ from it in the following respects:—

(*a*) Forewing rather more pointed at apex.

(*b*) *Upperside*: the pale area on the outer half of the forewing rather paler and more extensive.

(*c*) Terminal and sub-terminal markings on both wings much reduced.

(*d*) The ground colour of the terminal area on hindwing slightly paler.

(*e*) The hastate markings on hindwing quite clear and distinct as in *S. louisa*.

(*f*) *Underside*: ground colour much paler, of a biscuit colour and not so reddish.

(*g*) The ocelli on both wings not so well developed.

The *female* is very similar to the *male* on the *upperside*, but the outer pale area on forewing is much paler and almost white; the hastate markings on both wings are heavier, approaching the type in this respect.

Underside: Both wings: markings similar to the male, but the ground colour is greenish as in *S. suffusa* ♀. Mr. de Nicéville in his original description states: "In true *S. howqua* and its named variety the outer discal line and the submarginal band on both wings are half the distance apart that they are in *S. sparta*, and they have six and sometimes seven ocelli on the forewing, while *S. sparta* has only five."

Mr. South describes a form of *S. howqua* (J. B. N. H. Soc., Vol. XXII, p. 352), taken by Captain Bailey in the Mishmi Hills, as being intermediate between typical examples (?) from India (as far as I know the type of *Sparta* has hitherto been unique) and var. *suffusa*, Leech, from Western China.

Captain Porter has sent me a single male of a form of *Sticophthalma* taken by him on the Dihang River, Abor Hills, in July, which is identical in all respects with Manipur specimens. The Dihang River is not so very far from where Captain Bailey obtained his specimen on the Lohit River in the Mishmi Hills, and therefore it is highly probable that the two specimens belong to the same race. If this is so, the form described by Mr. South must be identical with specimens from Manipur, which are undoubtedly *S. sparta*; for it is highly improbable that *two closely allied forms* of a *Sticophthalma* should be found in Manipur. *S. sparta* appears to be closely allied to *S. louisa* and will probably prove to be a northern race of that species and not a race of *S. howqua* as considered by some authors.

Æmona amathusia, Hewitson.

Not uncommon in Manipur where many specimens of both sexes were taken in May and June and again in September and October at Saitu at the northern end of the Manipur Valley at about 4,000 feet, and on the Burma Road near Sebong. The butterfly, although not rare, appears to be extremely local and is found in dense shady nullahs. There are two broods in the year emerging in May and September, which do not differ from one another. *Æmona pealii*, Wood-mason, cannot, therefore, be the wet-season form of *amathusia* as considered by some authors. It may be a casual variety or a local race confined to the northern end of the Naga Hills. Sibsagar, the locality given for it, is an extremely unlikely place for it to be found, as it is in the plains. *Æ. pealii* was probably taken in the Naga Hills which adjoins the Sibsagar District.

Enispe euthymius, Doubleday.

There are three well-marked forms of this species occurring in Manipur and the Naga Hills.

(1) Typical *euthymius* of which four specimens were obtained on the Lengba and Irang Rivers in the Western Manipur Hills; three males in April and one in July, *i.e.*, in both the *dry* and *wet* seasons.

(2) Variety *tessellata*, Moore, of which three males were taken at Nichuguard, Naga Hills, in March and April, and many males and five females near Sebong on the Burma Road, Manipur, from March to July and again in November, *i.e.*, during both *dry* and *wet* seasons.

(3) A very dark form, which I propose calling *melæna*, of which I obtained two males at Nichuguard in the Naga Hills in June and October and two males on the Lengba River, Manipur, in March and April, *i.e.*, in both the *dry* and *wet* seasons. The above three forms are very distinct, and none of the specimens before me intergrade.

Typical euthymius is the palest form, the male of which lacks the straight black bar near the base of interspaces 2 and 3.

Var. tessellata ♂ is darker with heavier black markings and with a straight black bar near the base of interspace 2 and 3 on upper forewing; the basal half of both wings is also somewhat darker than the outer half.

Var. melæna is still a very much darker form; the ground colour is a richer red on the outer half of both wings and a deep red-brown on basal half. The black markings are very much heavier, forming on the forewing a broad black terminal band on which is a row of quadrate spots of the ground colour not touching one another. The black band near base of interspaces 2 and 3 as in *tessellata*, but broader and carried into the middle of interspace 1. *Underneath* also rather darker.

From the dates of capture given, it will be seen that all three forms occur *both in the dry* and *wet seasons* and, therefore, the intensity of the markings is not due to seasonal causes.

DISCOPHORA DEO, de N.

A single male taken at Nichuguard, Naga Hills, in April.

(To be continued.)

ON SMALL MAMMALS COLLECTED IN TIBET AND THE MISHMI HILLS BY CAPT. F. M. BAILEY.

By

Oldfield Thomas.

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Through the kind offices of the Bombay Natural History Society the National Museum has received a small series of Mammals obtained by Capt. F. M. Bailey during his last expedition to Tibet and the Mishmi Hills. The set includes several new and interesting forms.

The new Shrew from the Mishmis, *Soriculus baileyi*, described in a previous number of the Journal, was also obtained during the same expedition.

Genus Trogopterus.

Capt. Bailey obtained a Flying Squirrel in the Chumbi Valley of a type quite new to India, but proving to be a member of the Chinese genus *Trogopterus*. My examination of it has resulted in finding not only that it forms a special subspecies, but that the Chinese forms themselves need subdivision.

Trogopterus mordax, sp. n.

Size, as gauged by skull and teeth, markedly greater than in *T. xanthipes*.

General size no doubt greater than in *xanthipes*, but no fresh measurements available, hindfoot upwards of 55 mm. instead of 51. Colour on the whole much as in *T. xanthipes*, though rather richer and stronger. Undersurface similarly white washed with ochraceous. Hands and feet rich fulvous or tawny. Ear region more strongly tufted than in *T. xanthipes*, the longer bristles black, the tufts of short hairs at the base of the ears fulvous. Sides of muzzle fulvous.

Skull similar to that of *T. xanthipes* in all essential respects, but larger throughout, as may be seen by the measurements below. Bullæ very much larger. P^4 even larger in proportion to the molars than *T. xanthipes*.

Dimensions of the type, those of an example of *T. xanthipes* following in brackets :—

Hindfoot 58 mm. (51).

Skull, greatest length 62·3 (56·2); condylo-incisive length 56·3 (51); zygomatic breadth 37·7 (34·4); nasals 21 (18·3) × 11·2 (9·4); intertemporal breadth 10·6 (12); brain case, breadth above meatus 28·5 (26·5); palatilar length 31 (28·2); length of bulla 14·4 (12·3); upper tooth-series 17·2 (15·2); length of p^4 6·2 (5·4); molars only 11 (9·8).

Hab.—I-chang, Yang-tze kiang.

Type.—Adult male. B. M. No. 95. 7. 5. 1. Presented by Mr. F W. Styan. Nine specimens examined.

It is to Mr. F. W. Styan's generosity that the Museum owes not only its whole series of *T. mordax* from I-chang, but also the single specimen from "Peking" representing *T. xanthipes*. The latter agrees absolutely in size with the figures given by Milne-Edwards.

This is the *Trogopterus* of the Upper Yang-tze Valley and Sze-chwan, the original *T. xanthipes* having been obtained in Chihli, N. China by Fontanier, and being represented in the British Museum by a skin and skull from "Peking."

Two skins from the Upper Min Valley, Sze-chwan, obtained by Mr. J. W. Brooke are also referable to *T. mordax*.

The Chumbi *Trogopterus* has the long feet of *T. mordax*, but its skull is little or not larger than in *T. xanthipes*. It may be diagnosed as follows:—

TROGOPTERUS HIMALAICUS, sp. n.

Feet as long as in *T. mordax*. Fur thicker. General colour essentially similar but rather darker. Sides of muzzle and region at outer bases of ears grey like rest of head, not fulvous. Hands and feet brown, with fulvous end to the hairs, instead of wholly fulvous. Tail very thick and bushy, the hairs slaty for their basal three-fifth, then black and their tips buffy; but below there are no buffy tips, the terminal two-fifths of the hairs being deep black.

Skull of the type immature, but sufficiently grown to show that it would scarcely have attained a greater size than in *T. xanthipes*.

Dimensions of the type, measured in the flesh:—

Head and body 210 mm.; tail 233; hindfoot 57; ear 32.

Skull, greatest length 56·5; condylo-incisive length 51; nasals 18·5; length of mp4 4; molars only 10·2.

Hab.—Chumbi Valley, Tibet. Type from Gautsa, 13,800′.

Type.—Immature male. B. M. No. 14. 6. 24. 1. Collected by a native servant of Capt. Bailey's, and presented by the latter.

This western form of *Trogopterus* is distinguishable from its geographical ally *T. mordax* by its darker colour and especially by the diminution or absence of fulvous on its muzzle, ears and feet.

EPIMYS BRAHMA, sp. n.

Resembling *E. fulvescens*, Gray, but decidedly larger. Mammæ 1—2=6.

Fur softer and more woolly than in *fulvescens*, hairs of back about 10—11 mm. in length, the longer piles 18—19mm. General colour above near cinnamon-brown, becoming more buffy on the sides. Undersurface greyish white, the hairs white to their bases on the throat and middle line of belly and on the chest. Muzzle greyer

than black. Eyes surrounded by an obscurely darker ring. Ears of medium size, naked, grey. Hands and feet with the edges of the metapodials and whole of the digits white, the centre of the metapodials brown; pads large; fifth hind toe long, reaching to the middle of the second phalanx of the fourth. Tail long, finely scaled (about 15 rings to the centimetre), well haired, slightly tufted at tip, the terminal hairs about 5 mm. in length; dark brown above, rather lighter below. Mammæ apparently 1—2 = 6.

Skull light and thinly built in proportion to its size. Muzzle and interorbital region narrow; beading on latter well defined in frontal region but dying off on parietals. Brain-case smooth, rounded, convex above. Front of zygomatic plate as in *fulvescens*, nearly vertical, not projected forwards. Palatal foramina well open, extending backwards to the level of the front root of m¹. Bullæ small.

Dimensions of the type, measured in the flesh:—

Head and body 145mm.; tail 218; hindfoot 28; ear 25.

Skull, greatest length 36·2; condylo-incisive length 32·7; zygomatic breadth 17; nasals 13; interorbital breadth 4·9; breadth of brain-case 15·3; palatilar length 15·8; palatal foramina 7·1; upper molar series 6·4.

Hab.—Mishmi Hills. Type from Anzong Valley. Alt. 6,000'.

Type.—Adult female. B. M. No. 14. 6. 24. 2. Collected 3rd May 1913, by Capt. F. M. Bailey, and presented by him to the National Museum through the Bombay Natural History Society.

This distinct rat is readily separable from the only species it resembles, *E. fulvescens*, by its larger size, larger tooth-row, and less ridged skull. Whether it has any relationship to *Mus rimamemeus*, Blyth (1859), is immaterial, as that name is antedated by Pictet (1844).

Lepus oiostolus, Hodgs.

Capt. Bailey obtained two skins referable to *L. oiostolus*, one of them at Chamdokyang, about 150 miles East of Gyangtze, in a country of about the same altitude (15,000') and character as the latter. This specimen nearly agrees with typical *oiostolus* in its general buffy colour.

The other specimen came from much further to the East, where the country is more forested and at a lower altitude than the typical region of *oiostolus*. The hare is consequently somewhat different and may be sub-specifically distinguished as follows:—

Lepus oiostolus illuteus, subsp. n

General characters as in true *oiostolus*, but throughout, on head, ears, and back, the buffy is almost or quite absent, the hairs being mixed grey and cream colour, or cream-buff, and the general tone greyish or olive-grey. Undersurface pale slaty grey, that of *oiosto-*

lus being silvery grey at base, buffy terminally. On the undersurface however the chest patch has a suffusion of buffy, as in *oiostolus*, the rest being pure white. Head grizzled black and pale buffy; eye-rings cream-buff. Ears essentially as in *oiostolus*, but the buff replaced by grizzled blackish except along the terminal third of the metentote, where there is a buffy edging; fringe of proectote white. As in *oiostolus* the rump is slaty grey and the tail thick, bushy, wholly pure white except for an inconspicuous slaty line proximally above. Hands buffy above, feet white, the cushions of both below drabby.

Skull apparently very much as in true *oiostolus*.

Dimensions of the type, measured in the flesh:—

Head and body 492 mm.; tail 80; hindfoot 117; ear 102.

Skull, greatest length 83·5; condylo-incisive length 73·3.

Hab.—Kang-sar, about 250 miles East of Gyangtze, Tibet. Alt. 10,000′.

Type.—Immature male. B. M. No. 14. 6. 24. 3. Collected 12th August 1913 and presented by Capt. F. M. Bailey.

The specimen appears unfortunately to be somewhat immature, but examples of true *oiostolus* of similar age show the same strong buffy colour that is characteristic of the adults. In general body colour this new form somewhat more resembles the *L. kozlovi* of still further Eastward, but that species has not the highly characteristic white tail of *L. oiostolus*.

Besides the above new forms Capt. Bailey obtained an example of *Nectogale sikhimensis*, de Wint., from Karpo, Tibet, and one of *Ochotona curzoniæ*, Hodgs., from Nyerma La, 15,000′.

NOTES ON THE BIRDS OF UPPER ASSAM.

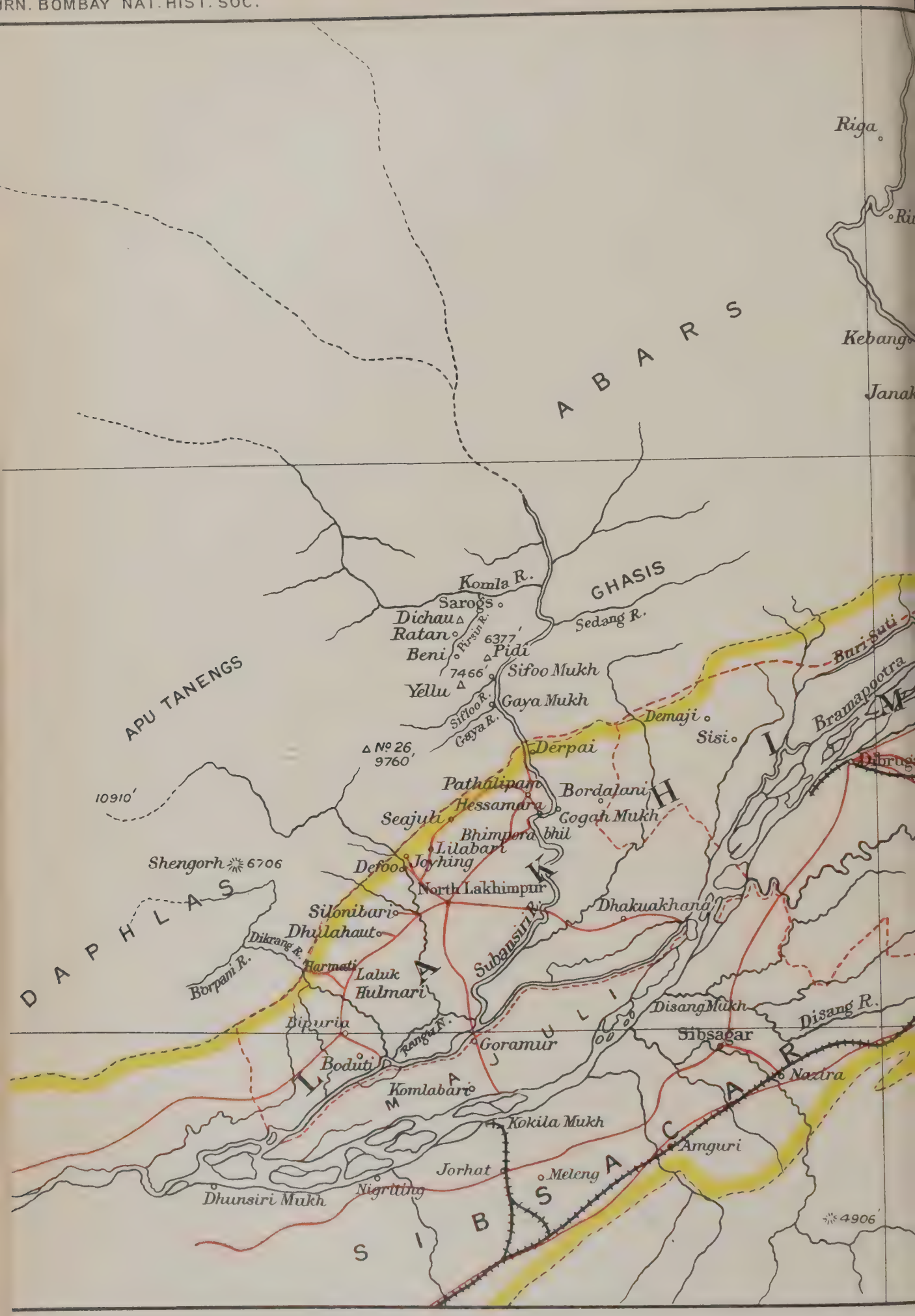
By

H. Stevens, m.b.o.u.

Part I.

Upper Assam politically comprises the subdivisions of Lakhimpur* and Dibrugarh in the Lakhimpur district, practically the tract of country lying north of the 27th parallel of north latitude encroaching on the adjacent district of Sibsagar and limited by the indefinite arbitrary frontier line of British jurisdiction which follows the contour of the hills at their base around the head of the valley; but considered from our standpoint of Zoo—Geographical Distribution as a northern area of the Oriental Region enclosing portions of the Himalayan and Burmese subregions would include several of these hill ranges. Our knowledge of the hill districts with the exception of the south-eastern ranges however is very imperfect, and so far as the north and north-eastern frontier is concerned almost a complete blank due to several causes. The natural inhospitality and impenetrability of their forest-covered slopes, the suspicious hospitality of the various tribes, the stringent restrictions issued by an administration averse to any transfrontier excursions, and also the lack of means of communication, combined with the tropical rains experienced during the south-west monsoon, irrespective of a considerable local rainfall, which renders the routes traversed impassable and restricts a journey of that description to the cold season when such an undertaking can only be attempted. The numerous waterways constitute the main physical features of the valley, foremost of which is the Bramapootra with its main affluents, the Subansiri and the Dihing, other minor rivers emerge through picturesque and impressive gorges in the hills on the north and add their quota to its waters. During the period of torrential rains a large proportion of the land is submerged. The appearance of the country at this time is a striking contrast to its cold season aspect when the rivers are at a low ebb and exhibit vast expanses of sand. The diversified vegetation compensates somewhat for the monotonous level of the alluvial land and the hills which rise in rapid succession on the northern frontier clothed to their summits in virgin forest and backed by the snow-capped peaks of higher elevations afford a pleasing panorama during the cold weather months when the atmosphere is free from humidity. The deforestation and the opening up of large areas of land by the tea industry has been in progress many years: each succeeding year also results

* The Post Office designation, North Lakhimpur, is invariably used for this subdivision.



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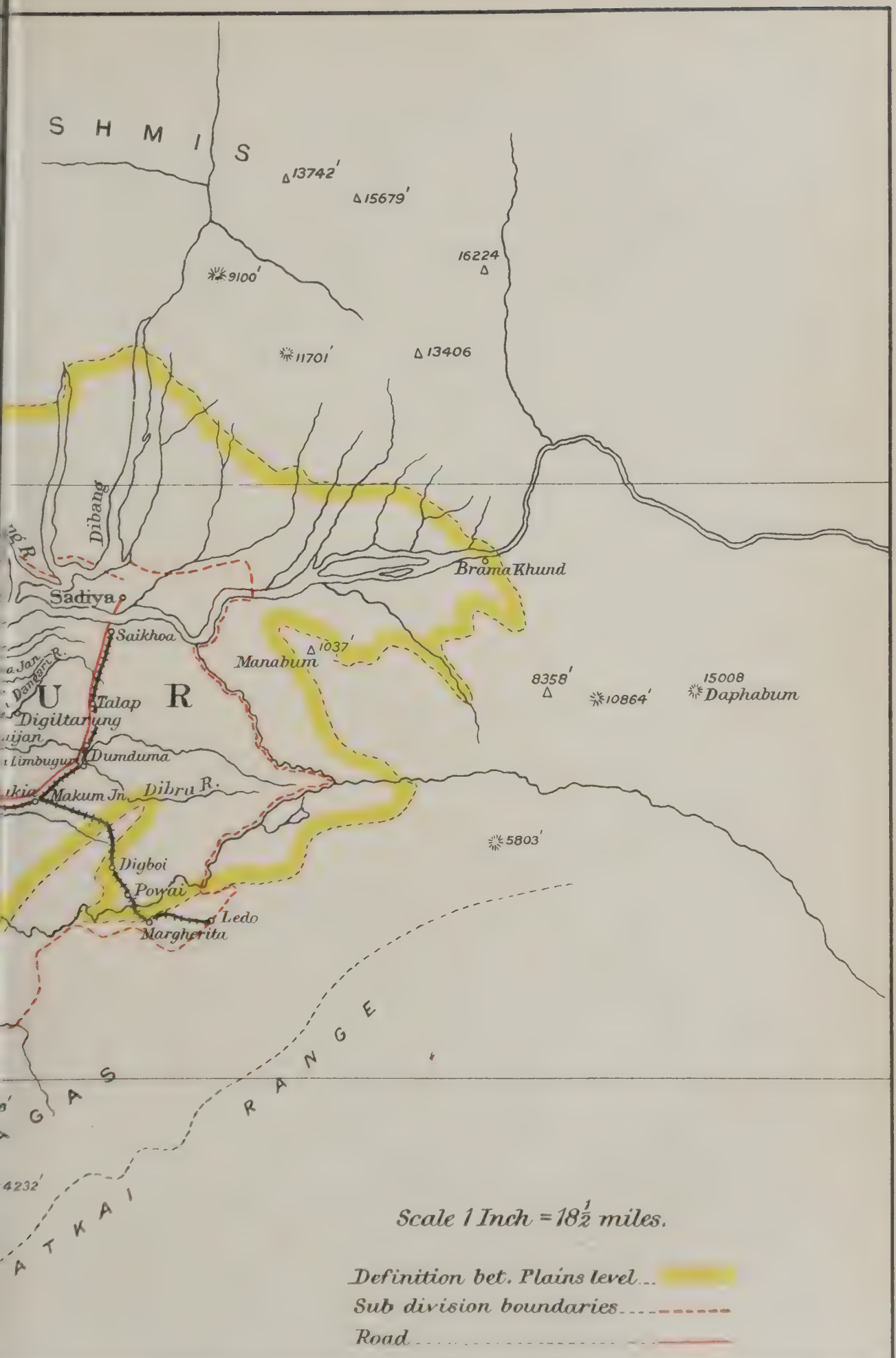

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in a great increase of low-lying land brought under cultivation by the time-expired immigrant labourer. * Vast tracts of grass, "chopras," reed, "cagri," "ekra," "nulni" and forest land, Government timber reserve and otherwise fortunately yet remain, which in many quarters might be utilized as sanctuaries for the preservation of the fauna as well as botanical reserves; and if safeguarded by an adequate and strict, impartial application of regulations would prolong and possibly prevent the extermination of some of our noblest mammalia, a result only too frequently regarded as the inevitable consequence of the advance of civilization. These frequent notes are based on data commenced in 1901, made during residence in the above two subdivisions, inclusive of a five months' furlough in the cold season, 1905-6, when a visit was paid to the Abor-Miri country on the right bank of the Subansiri with particular reference to distribution, dates of arrival and departure of migrants, the substantiation of the claims of rare and previously unrecorded visitants. This list, although containing some 470 odd species makes no pretence at completeness. The claims of strict priority† have been followed out and trinomials used wherever available, as some slight contribution to stability and uniformity in nomenclature:—

Breadth of valley 60 miles.
Elevation of valley, average 430 feet.
Rainfall, average 115 inches.

An average of 140″—180″ is general for localities at the base of the hills on the north, the nearer approach to the hills the more appreciable is the difference in rainfall.

The photos have been chosen to illustrate the various physical features of the country though not lacking in pictorial effect.

1. *Corvus macrorhynchos levaillantii*, Less. [4]—Jungle Crow.
Corvus macrorhynchus (Oates), F.B.I., Vol. i, p. 17.

Resident, common throughout the whole valley, although occasionally is found in solitary pairs in outlying localities, generally is sociable, congragating in some numbers, especially during the cold weather months when its curiosity attracts it alike to the camp of the shikari or the flimsy dwelling of the ryot, anywhere, in fact, wherever it can find sufficient support in refuse and garbage as nothing comes amiss to its depraved taste.

Dejoo, North Lakhimpur, 29-4-10. A jungle crow seen flying overhead carrying an egg in its gape. There must be a considerable amount of destruction done to nesting birds attributable to this marauder. The pendent nests of the Bayas (*Ploceus megarhynchus*, Hume, *Ploceus manyar*

* No apology is surely required for referring to this all-important matter of special interest to Zoologists, even in a paper of this description. See "Nature," Thursday, September 9, 1909, p. 317. II Organising Zoology. Opening address by Prof. A. E. Shipley, President, Zoological Section. The British Association at Winnipeg. "On the Appalling Waste of Animal Life with its one only result."

† The original gender of all specific names which appear as adjectives has been preserved and are treated as names only not as adjectives in connection with the genera as substantives.

flavirceps, Less.) are particularly subject to attack. King crows (*Dicrurus*) also suffer from their depredations in spite of their aggressive habits ; the exposed positions of their nesting sites offer an easy inducement to pillage.

Dejoo, 29-5-10. A huge tree in an isolated corner of the garden on whose branches a pair of jungle crows had their nest was blown down last night. I saw these birds to-day busily occupied rebuilding their new quarters some short distance away in the Forest.

Silonibari, 20-4-11. I noted a jungle crow feeding on the berries of a Seleng tree (*Sapium baccatum*), possibly a non-paired bird; another pair were in company with some Green Pigeon (*Sphenocercus apicauda*) and a small species (*Treron nipalensis*) on the same tree.

2. *Corvus splendens*, Vieill. [7]—House Crow.

Everywhere numerous and obtrusive in its habits. A close attendant on the " bawarche " and his preserves, although not so troublesome as in more populous districts. Very frequently bamboo clumps are selected as a nesting site and light tree growth in a secluded part on the sandy "churs" of the rivers at no great height from the ground is the home of a colony.

Dejoo, 22-12-08. This morning I witnessed the unusual sight of a band of crows mobbing a kite (*Milvus melanotis*) which held one of their deceased members in its talons. I followed them as far as my vision allowed but failed to see its termination. From the noise and general commotion the kite appeared to be in for a rough time as long as it retained its quarry, though it is very improbable that it had met its death through any action of the kite.

3. *Cissa chinensis* (Bodd.) [14].—The Green Magpie.

" Telpili," Daphla.

Plentiful in the dense evergreen forests at the base of the hills around the valley. In North Lakhimpur its range extends over the watershed into the Abor-Miri hills, where it was noted in the vicinity of the " changs " in February. From November to February it appears to desert its customary haunts and frequent the more open precincts of cultivation, when it is by no means shy, but more often betraying its presence by its loud piping call. The few records of its visits to Rungagora in the plains were always at the end of March or early April, and possibly indicate a local sporadic movement. Three records: 9-8-08*, 26-8-07, 2-9-08*, Dejoo, are rather unusual early appearances. Rungagora, 21-3-03, a specimen received in the flesh with the terminal portion of crest feathers light blue and the back similarly splashed in colour. Seajuli, 19-11-11, I had shot a Green Pigeon (*Sphenocercus apicauda*) (Blyth.) in dense forest and having placed the bird on the fork of a sapling near at hand was remaining motionless at the foot of the tree awaiting the arrival of others, when a Green Pie came within a few paces from me, attracted by the dead pigeon ; it scrutinized my capture and eventually succeeded, after some probing, to dislodge it. On the bird falling to the ground, I made

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* An Asterisk denotes an observation.

The number in brackets after each species corresponds to Oates' and Blanford's Volumes I-IV : Birds ; these numbers might with advantage in the next edition be tabulated in the index column for the use of correspondents, &c. The generic and specific name as figuring in these same Volumes, wherever differing from the adopted nomenclature, is similarly inserted. The field notes in many cases record trivial and common place incidents, yet are accurate statements of observationsas actually jotted down in my note-book at the time, and thus may not be without value. Wherever the month is given after the locality, it does not necessarily follow that the species only occurs at that period, unless otherwise stated, but that specimens have been collected at those localities and those months serve as a basis for future study.

a more decided movement which put an end to the episode by the Pie's departure.

4. *Dendrocitta rufus* (Scop.) [16].—Indian Tree-pie.

Partial to the more cultivated tracts of the country; often seen in bungalow compounds. In North Lakhimpur occasionally visits Dejoo at the base of the hills but only as a straggler.

Maijan, May 1901, ♂ ♀ *; Rungagora, not common, 16-2-02, ♀; Dejoo, 18-2-05 ♀, 18-2-09* single.

5. *Dendrocitta himalayensis* (Blyth.) [18].—The Himalayan Tree-pie.

Common throughout the plains in the Dibrugarh district. Occurs in the Abor-Miri hills up to 5,000′ altitude at all events. This Tree-pie is the most generally distributed of the three species.

6. *Dendrocitta frontalis*, McClell. [19].—Black-browed Tree-pie.

Occurs throughout the plains. In habits if anything less wary than *D. himalayensis*. Rungagora, 8-11-01* I noted a pair of these Pies hawking for winged termites after the manner of King Crows (*Dicrurus*) from the tops of some bamboo clumps at evening.

Neither of these two Tree-pies are said to occur in the plains (Oates) and are regarded as hill species. Their occurrence in the plains of Upper Assam is no doubt, as in several other cases, due to the close proximity of the hills and the peculiar configuration of the land hemmed in at the head of the valley.

Iris reddish-brown; bill and tarsus black.

7. *Parus major cinereus*, Vieill. [31].—Indian Grey Tit.

Parus atriceps, Horsf. Oates, F. B. I. Vol. i., p., 46.

Throughout the whole area in cultivated tracts, not in forest.

The sole representative with the exception of *P. sultaneus* of this interesting genus at low elevations.

8. *Parus sultaneus sultaneus*, Hodgs. [255].—The Sultan Bird.

Melanochlora sultanea, Oates, F. B. I., Vol. i., p. 241.

Throughout the plains in evergreen forest and secondary jungle, frequents the tops of the trees, more in evidence at the cold season. Undoubtedly a specialized tropical form; a tit both in structure and habits, rightly relegated to its true position in this genus by its original describer Hodgson. Titadimora, Panitola, Rungagora, Margherita, Joyhing, Dejoo.

9. *Aegithalos erythrocephalus erythrocephalus* (Vig.) [35].—Red-headed Tit.

Ægithaliscus erythrocephalus, Oates, F. B. I., Vol. i., p. 50.

Plentiful in the vicinity of the "changs" at 4,000′ in March in the Abor-Miri hills on the right bank of the Subansiri. Partial to secondary scrub growth in small parties.

10. *Paradoxornis flavirostris*, Gould. [51].—Gould's Parrot-billed Babbler.

"But but" serai. Plains Miris.

On the north or right bank of the Bramapootra from Komolabari to the base of the hills in North Lakhimpur is generally distributed in suitable localities. Its favourite haunts are dense thickets of reeds "ekra" and "tora" or wild cardamom in "hoolahs" and low-lying ground "bhils," and also in the mixed grasses "nulni" and "lui," &c., of the "chopras" along the banks and bed of the Subansiri and other rivers. Its striking whistle best represented by the syllables "phew," "phew," "phew" "phuit" commencing in a low tone, which is increased in rapidity both in volume and inflection, gives a certain clue to its presence and is sometimes the only means of locating its whereabouts, as it is very chary of showing itself excepting at early morn and before sunset, when they rise to the

tops of the reeds. They scuttle across the open patches to reach a place of safety and keep low down close to the ground when under observation. The noise made by their mandibles as they nibble at the flowers of the reeds and grasses is distinctly audible, though the birds may not be visible. Joyhing, Dejoo, Hessamara, Gogaldhubie, Silonibari, Komolabari, Hulmari, Boduti, Dhunsirimukh, south bank of Bramapootra.

Iris olivaceous brown; bill deep yellow; tip and culmen of upper mandible horny white; tarsus bluish olive or plumbeous. Dissection of stomach has proved their food to be chiefly vegetable substances; seeds of "nul" grass, larvæ, earwigs, &c., found in the flowers and crevices of the various grasses and reeds. Hessamara, 9-4-05, nest containing two eggs.

11. *Suthora ruficeps atrosuperciliaris*, Godw-Aust. [59].—Austen's Parrot-billed Babbler.

Suthora atrisuperciliaris, Oates, F. B. I., Vol. i., p. 59.

Apparently confined to the north-eastern corner of the valley. Occurs above Margherita.

12. *Psittiparus ruficeps bakeri*, Hart. [60].—Baker's Parrot-billed Babbler.

Scæorhynchus ruficeps, Oates, F. B. I., No. 60 (*part*).

Occurs around Margherita. Failed to meet with it in the plains.

13. *Ianthocincla ruficollis*, Jard and Selby. [62].—Rufous-necked Laughing Thrush.

Dryonastes ruficollis, Oates, F. B. I., Vol. i., p. 73.

Confined to the plains. Common in every description of scrub and reed jungle, only frequents the outskirts of forest. In consequence the base of the heavily timbered hills in North Lakhimpur is the limit of its range on the north.

14. *Ianthocincla nuchalis* (Godw.-Aust.) [63].—Ogle's Laughing Thrush.

Dryonastes nuchalis, Oates, F. B. I., Vol. i., p. 74.

Confined to the north-eastern corner of the valley. Plentiful around Margherita.

15. *Ianthocincla leucolophus leucolophus* (Hardw.) [69].—Himalayan White-crested Laughing Thrush.

Garrulax leucolophus, Oates, F. B. I., Vol. i., p. 77.

Common alike in forest, both in the hills and plains.

16. *Ianthocincla pectoralis* (Gould.) [72].—Black-gorgeted Laughing Thrush.

Garrulax pectoralis, Oates, F. B. I., Vol. i., p. 80.

Plentiful in forest throughout the whole area. Occurs over the water-shed in the Abor-Miri hills.

17. *Ianthocincla moniligera* (Hodgs.) [73].—The Necklaced Laughing Thrush.

Garrulax moniliger, Oates, F. B. I., Vol. i., p. 81.

Its range coincides with the former nearly throughout the plains as proved by the collection of specimens on both sides of the valley. Appears to be the most plentiful of the two species.

18. *Ianthocincla gularis*, McClell. [74].—McClelland's Laughing Thrush.

Garrulax gularis, Oates, F. B. I., Vol. i., p. 81.

Confined to the base of the hills. Probably has a continuous range around the head of the valley. Equally plentiful in North Lakhimpur and Margherita. Absent from the plain.

Colouration, juvenis 2-7-04, ♂; 25-8-04, Dejoo. Crown black, fringed at base with rufous, visible portions of wings deep red brown, much richer than adult, the ashy grey of breast and upper abdomen mixed with rust colour,

19. *Ianthocincla rufogularis rufogularis*, Gould. [80]. —Rufous-chinned Laughing Thrush.

Specimens collected in the Abor-Miri hills agree with the typical form. Found in pairs in February in dense secondary growth. Approximate elevation 4,000′. *I. r. assamensis*, Hart. is evidently the form that occurs above Margherita. ♂, 12-2-06, Beni. Lores white, chin merely at tip rufous, breast suffused ashy, back rich fulvous. tertiaries tipped with defined white.

20. *Ianthocincla phœnicea phœnicea* (Gould.) [87]. —Crimson-winged Laughing Thrush.

Trochalopterum phœniceum, Oates, F. B. I, Vol. i., p. 93.

Abor-Miri hills. The former note applies to this species.

I. p. bakeri, Hart. is the form from the Khasi hills, which probably extends into our area on the south.

21. *Grammatoptila striata austeni*, Oates. [102].—Austen's Striated Laughing Thrush.

Grammatoptila austeni, Oates, F. B. I., Vol. i., p. 104.

Abor-Miri hills, right bank, Subansiri. All my specimens were procured in forest along the hillsides on the north of the watershed. Iris red brown: bill dark bluish horny; tarsus bluish grey; soles yellow.

22. *Argya earlii* (Blyth.) [104].—The Striated Babbler.

Generally distributed, peculiar to heavy grass land and abundant where found. A series collected at Komolabari (Bramapootra "churs") and Hessamara (Subansiri "churs"). Oates' notes on this bird's habits could not be improved upon. *Argya longirostris* is recorded from Sadiya and *Crateropus canorus* as occurring to the extreme east of Assam. Information is required as to the status of both these birds in Upper Assam. I was under the impression I saw a party of these latter birds in North Lakhimpur, 26-12-10, but as no specimens were secured this record lacks substantiation, otherwise failed to meet with either species.

23. *Pomatorhinus schisticeps*, Hodgs. [116].—Slaty-headed Scimitar Babbler.

Occurs throughout the whole district, sparingly in the plains, more plentiful along the base of the hills and hillsides at low elevations. Found in scrub growth, frequently in company with *Ianthocincla ruficollis* in the plains or amongst the bamboo jungle on the hillsides with *Gampsorhynchus rufulus*. Solitary instance secured at Rungagora (plains), 18-3-03, ♂.

24. *Pomatorhinus ferruginosus*, Blyth. [122]. —Coral-billed Scimitar Babbler.

Parties in February, Abor-Miri hills. The only Scimitar Babbler procured on the north side of the watershed.

25. *Pomatorhinus macclellandi*, Jerd. [130]. —McClelland's Scimitar Babbler.

Dinjan (plains), 18-1-02, ♂, ♀. Rungagora (plains), 18-3-03, ♀.

The only records: the latter coincides with the only record for *P. schisticeps* for the plains; both were secured at the same time. I am inclined to think this bird is somewhat locally migratory.

Iris salmon yellow; orbital skin and bare space behind eye plumbeous: bill horny, lighter towards tip and lower mandible at base: tarsus light pinkish brown; claws light horny.

26. *Pomatorhinus hypoleucus* (Blyth.) [131].—The Arrakan Scimitar Babbler.

Plentiful in the north-east corner, Margherita. Recorded for the Daphla hills. Failed to meet with it in North Lakhimpur. This latter locality is probably erroneous.

27. *Timelia pileata,* Horsf. [134].— Red-capped Babbler.

Throughout the whole district in the plains. Confined to reed and grass jungle in low-lying land and along the banks of rivers.

28. *Gampsorhynchus rufulus,* Blyth. [137].— White-headed Shrike Babbler.

More plentiful along the base of the hills than in the plains, partial to bamboo jungle, seen in parties, March searching for food in company with Drongos, Wood Shrikes (*Tephrodornis pelvicus*), &c. They do not shun observation and keep well above the ground.

29. *Pyctorhis altirostre* (Jerd.) [141].— Yellow-eyed Babbler.

Locally distributed in the plains. The "churs" covered with dense grass in the beds of the main rivers are its favourite haunts, although heavy reed land and the vegetation on the banks of some of the hill rivers are eminently suitable : only odd pairs are there to be met. Its note resembles the syllables "chew," "chi," "chi," repeated several times.

Hessamara (Subansiri), Bhimpoora Bhil (Gogaldhubie), Komolabari, Dejoo, R. Lilabari. Iris greenish pink or brown ; orbital skin greenish yellow ; bill pale purplish thorny ; upper mandible darkest ; tarsus pinkish horny. Stomach on dissection contained small seeds and vegetable substance only in one example.

30. *Pellorneum mandellii,* Blanf. [142].— Mandelli's Spotted Babbler.

Throughout the plains, more plentifully distributed at the base of hills on both sides of the valley. It utters a loud pleasing call of two syllables when searching for food on the ground amongst dead leaves and decaying vegetation.

Rungagora, occasionally seen in secondary scrub in the cold weather. Nazira, Sibsagar, calling first week, November 1910. Margherita, numerous specimens collected, November to February ; Dejoo, February, April, June, July, December ; Derpai, January. Young bird, ♀, taken 28-4-03, Dejoo.

31. *Pellorneum palustre,* Jerd. [146].— Marsh Spotted Babbler.

Its range and habitat coincides with *Timelia pileata.* Hessamara, Bhimpoora Bhil, Gogaldhubie, Dejoo, R. Komolabari, Rungagora, R. Dibru. Its call is the reverse of *Pyctorhis altirostre,* and is best expressed in the syllables " chi," "chew" repeated in a loud tone.

Iris bright brown; bill horny brown ; base of lower mandible tinged blue ; tarsus pale horny blue.

32. *Pellorneum ignotum,* Hume [148].—The Assam Babbler.

Decidedly local, occurs around Margherita.

Dejoo, North Lakhimpur, 10-2-07, ♂, ♀ (secured); 20-3-08, ♂, ♀ (secured); 27-11-10* two pairs observed.

These records refer to localities a short distance from the base of the hills in reed and scrub growth in low-lying forest land.

Iris sienna brown ; bill bluish horny; tarsus and claws pale purplish fleshy.

33. *Drymocataphus assamensis,* Sharpe [152].—Austen's Babbler.

Possibly locally distributed, extends a short distance away from the base of the hills in North Lakhimpur, but is decidedly a terai denizen. Plentiful between the Panchnoi R. and Runganuddie (foot of Daphla hills), also around Margherita. Its occurrence in the plains somewhat doubtful. One of the few birds to relieve the gloom of the forest depths, hopping in and about the undergrowth after the manner of a mouse. Note a loud "tsip ;" occurs in pairs. Iris sienna brown ; bill horny ; tarsus dull fleshy.

34. *Corythocichla striatus* (Wald.) [154].—The Streaked Babbler.

Apparently peculiar to the north-east corner around Margherita within our limits.

35. *Turdinus abbotti* (Blyth) [160].—Abbott's Babbler.

Locally distributed at the base of the hills in North Lakhimpur. Secured on half a dozen occasions. Silonibari, Dejoo, Derpai.

Iris light brown; bill bluish horny ; upper mandible rather darker than lower mandible; tarsus fleshy horn.

36. *Thringorhina oglei* (Godw.-Aust.) [162].—Austen's Spotted Babbler.

Confined to north-east corner, Margherita.

37. *Proparus nipalensis* (Hodgs.) [163].—The Nepal Babbler.

Alcippe nepalensis, Oates, F. B. I., Vol. i., p. 157.

Throughout the plains and hills around the head of the valley in forest; everywhere numerous if not conspicuous.

38. *Stachyris nigriceps*, Hodgs. [169].—The Black-throated Babbler.

Stachyrhis nigriceps, Oates, F. B. I., Vol. i., p. 162.

Distributed in the plains and hills, although not common.

39. *Stachyris chrysæa*, Blyth [170].—Golden-headed Babbler.

Stachyrhis chrysæa, Oates, F. B. I., Vol. i., p. 163.

Similar in distribution as *S. nigriceps*. By no means restricted to a particular habitat, reeds and similar growth apparently as much to its liking as the dense vegetation on the hillsides. Margherita, Beni, Ganditola, Dejoo (Rungagora, not common).

40. *Stachyridopsis ruficeps rufifrons* (Hume) [173].—Hume's Babbler.

Stachyrhidopsis rufifrons, Oates, F. B. I., Vol. i., p. 165.

Sparingly distributed in the plains, plentiful along the terai. This Babbler undoubtedly replaces the typical form in Upper Assam, although the latter is recorded for Dibrugarh. Personally I have failed to meet with it. Margherita, Gogaldhubie, Seajuli, Dejoo, (Rungagora, not common).

41. *Mixornis rubicapilla* (Tick.) [176].—The Yellow-breasted Babbler.

Mixornis rubricapillus, Oates, F. B. I., Vol. i., p. 167.

Distributed throughout the plains. Partial to light forest growth not the dense evergreen forests. Feeds on and keeps to the ground when in thick scrub.

42. *Proparus rufigularis* (Mand.) [180].—The Red-headed Tit Babbler.

Schœniparus rufigularis, Oates, F. B. I., Vol. i., p. 170.

This Tit Babbler is resident throughout the whole breadth of the valley from the Daphla hills to the Naga hills. In the hills on the North Frontier (Abor-Miri country) is displaced by *Pseudominla cinerea* after the first low ranges. Strictly confined to undergrowth in the evergreen forests amongst which it creeps about in parties of six or thereabouts in the cold season, but later on at the commencement of the nesting time is found in pairs. *P. mandellii* is recorded for the Daphla hills. Personally I have failed to meet with it at low elevations in these hills ; this locality is probably erroneous.

43. *Pseudominla cinerea* (Blyth.) [181].—The Dusky Green Tit Babbler.

Sittiparus cinereus, Oates, F. B. I., Vol. i., p. 171.

Confined to the valleys and slopes of the hills on the North Frontier on both sides of the water shed, although absent from the first few low ranges found as high as 5,000′ in the Abor-Miri hills. Similar in habits to *Proparus rufigularis*, but the parties frequently number a score or thereabouts. Partial to light open tree jungle and brush wood in forest. Its note is a low twitter.

44. *Pseudominla castaniceps* (Hodgs.) [182].—The Chestnut-headed Tit Babbler.

Sittiparus castaneiceps, Oates, F. B. I., Vol. i., p. 172.

Obtained in the Abor-Miri hills. Keeps more to higher vegetation than *P. cinerea* always in company with other Babblers and Warblers, whereas *P. cinerea* held aloof from other species. In habits very creeper like as it searched the tree trunks when foraging for food. A small series show a more decided rufous tinge on back in comparison with East Nepal specimens. A sufficient character to entitle it to so called sub-specific rank.

45. *Rimator malacoptilus*, Blyth. [185].—The Long-billed Babbler.

Rangchilla, a spur of Yoloo, north side Abor-Miri hills 4,500′ approximate elevation, 22-11-06, ♂, ♀. This pair of Babblers sprang up at my feet as I descended the slope and was secured with some trouble, owing to my close proximity. In order to avoid damaging them for specimens I had to step back on the slippery ground whilst fixing my attention on the birds. Fortunately there was very little undergrowth, though the ground was covered in dead leaves with which their plumage assimilated. The bills were smeared with soil. Previously recorded only for Sikkim and Manipur at considerable elevations. Iris brown : Bill, upper mandible and gape, dark horn lighter towards tip ; under-mandible pale bluish horn : tarsus pale purplish horn.

46. *Turdinulus roberti roberti* (Godw.-Aust. and Wald.) [186].—Robert's Babbler.

Turdinulus roberti, Oates, F. B. I., Vol. iv., p. 480.

On the North Frontier occurs on both sides of the watershed at the base of the hills in North Lakhimpur and in the valleys in the Abor-Miri country. Probably extends around the foot hills at the head of the valley as it is found above Margherita.

Dejoo, 10-5-07. A nest containing four young was brought in, distance three miles from the foot of the hills in dense virgin forest. This is the farthest limit away from the hills to my knowledge that this Babbler occurs. Found up to 5,000′ on the north frontier. Difficult to secure, as it turns over decayed leaves on the ground in your close proximity, calmly ignoring your presence.

47. *Myiophoneus temminckii temminckii*, Vig. [187].—The Himalayan Whistling-Thrush.

Myiophoneus temmincki, Oates, F. B. I., Vol. i., p. 178.

Confined to the hill rivers around the head of the Valley. Extends a short distance into the plains in North Lakhimpur during the cold season.

48. *Drymochares hyperythra* (Jerd. & Blyth.) [196].—Rusty-bellied Short-wing.

Occurs along the terai and extends a short distance into the plains in North Lakhimpur at the cold season. Records from Gogaldhubie and also Margherita, in the north-east corner. The following notes give specific data:—Hessamara, 9-1-05, ♂, secured in reeds: Panchnoi R., base of Daphla hills, forest nullah, 30-11-05, ♂; Dejoo R., base of Daphla hills, forest undergrowth 22-12-07, ♂* and scrub, January 1911, ♂, ♀*.

Female noted on one occasion only. Haunts undergrowth in forest, thick secondary scrub and dense thickets of reeds. Quite fearless and in consequence most difficult to secure at such close range in a satisfactory condition for a cabinet preparation, unless procured without the aid of powder and shot. Iris hazel-brown ; bill black ; tarsus horny.

49. *Drymochares nipalensis* (Hodgs.) [198].—Nepal Short-wing.

Numerous specimens obtained from Margnerita. Rare in North Lakhimpur ; two records only. A denizen of forest undergrowth. All the males in my collection from Assam are in similar plumage to the female. The call of this short-wing is a loud note of a single syllable. Base of Daphla hills Panchnoi, R., 30-11-05, ♀, and Joyhing R., 27-11-10, ♂.

50. *Tesia cyaniventer*, Hodgs. [201].—Slaty-bellied Short-wing.
Tesia cyaniventris, Oates, F. B. I., Vol. i., p. 192.

Occurs throughout the whole area in forest during the cold season. Partial to saplings and undergrowth on which it hops up and down, whilst uttering a high pitched note. Oates makes a great difference in the colouration of the sexes particularly the forehead, crown and nape. My impression is the sexes are alike. One specimen 10-1-04, ♂, which is apparently adult, has the crown coloured sap:green without the trace of any golden tinge; the lower half of orbital ring is white.

51. *Tesia castaneocoronata* (Burton) [202].—Chestnut-headed Short-wing.
Oligura castaneicoronata, Oates, F. B. I., Vol. i, p. 193.

Descends to the base of the hills in North Lakhimpur during the cold season. Occurs in the valleys on the north side of the watershed of the Abor-Miri hills. Apparently returns to its old quarters on its descent to the foot of the hills. I noted this prettily-coloured short-wing in the almost sunless recesses of the Pobha, a stream which enters the Subansiri gorge on the left bank ; again the following cold season, 26-1-06, it was in evidence at exactly the same spot. It may yet be found during the cold weather months farther out in the plains. There was one locality on the right bank of the Dibra in forest where I was almost positive of seeing it amongst some brushwood, as I never secured any specimens, this record lacks substantiation, although there is no mistaking such a strikingly coloured bird if once properly seen. This locality refers to a mile or so below Rungagora. Panchnoi gorge, Daphla hills, base, 23-11-05, ♀ ; Kotur Valley, Beni, Abor-Miri hills, 13-2-06, ♂, 22-2-06, ♂ ; Seajuli, North Lakhimpur, base of hills, latter weeks in November 1911.*

52. *Sibia picaoides*, Hodgs. [203].—Long-tailed Sibia.

Descends to the base of the hills in North Lakhimpur during the cold season ; partial to the tall Simal trees (*Bombax malabaricum*) when in flower. Flocks sometimes number up to twenty individuals. January and February. Joyhing, Derpai, Lilabari, Subansiri gorge above Sifloo Mukh.

Iris crimson, occasionally light brown, irrespective of sex ; bill black ; tarsus purplish grey.

53. *Actinodura egertoni*, Gould [211].—Rufous Barwing.

Obtained in February, Abor-Miri hills. Frequents light secondary growth in forest in parties of six to eight individuals. Colouration of soft parts : Iris bluish brown ; bill dull yellow horny ; darker on culmen and tip ; tarsus fleshy horny.

54. *Staphidia rufigenis* (Hume) [217].—Hume's Staphidia.

Occurs in the Abor-Miri hills and the Gorge of the Subansiri (Ganditola, Virgua stream). Very tit like in their habits ; parties sometimes number as many as thirty birds, Iris reddish brown ; bill horny purple, dark at tip ; tarsus brownish fleshy ; claws horn colour.

55. *Siva cyanouroptera cyanouroptera*, Hodgs. [221].—Blue-winged Siva.

In North Lakhimpur ; descends the gorges to the foot of the hills and extends a few miles distant into the plains. Partial to light tree growth and scrub jungle. Occurs on the other side of the valley at Margherita ; Beni, Abor-Miri hills, Gogaldhubie ; (Plains), North Lakhimpur, Dejoo (Base of hills) ; Subansiri Gorge ; Pobha Mukh.

56. *Yuhina nigrimentum* (Hodgs.) [225].—Black-chinned Yuhina.

Beni, Abor-Miri hills, 4,000′ approximate, Feb. 1906. These attractive birds used to frequent in small parties almost daily some tall trees below the "changs" several of which were secured. This Yuhina probably is a bird of lower elevations than the other two species of the genus.

Iris brown ; bill at base red ; in lower mandible merging into yellow at tn upper mandible with above exception black ; tarsus dark yellow ochreous. ip;

57. *Zosterops palpebrosa palpebrosa* (Temm.). [226].—The Indian White-eye.

Common throughout the plains in secondary growth.

58. *Ixulus occipitalis* (Blyth.) [231].—Chestnut-headed Ixulus.

In North Lakhimpur descends the gorges to the foot of the hills in the cold season in small parties, but is more plentiful on the north side of the watershed. Joyhing Gorge, Subansiri Gorge, January; Beni, Abor-Miri hills, February.

Iris red brown ; bill horny black ; tarsus and claws dull olivaceous.

59. *Ixulus flavicollis* (Hodgs.) [232].—Yellow-naped Ixulus.

The previous remark applies to this *Ixulus*, possibly more frequently met with on the south side of the North Lakhimpur hills than *I. occipitalis*. Joyhing Gorge, Derpai, Dejoo, Beni, Abor-Miri hills.

Iris red brown ; bill horny ; tarsus dull yellow. One bird's stomach contained small berries on dissection.

60. *Erpornis xantholeuca xantholeuca* Hodgs. [234].—The White-bellied Herpornis.

Herpornis xantholeuca, Oates, F. B. I., Vol. i., p. 219.

Throughout the plains in the cold season at all events. In evergreen forest, generally haunts the open spaces through which the sun can penetrate and where insect food is plentiful in company with *Phylloscopi*, *Cryptolophas*, &c.

61. *Leiothrix lutea callipyga* (Hodgs.) [235].—The Red-billed Liothrix.

Liothrix lutea, Oates, F. B. T., Vol. i, p. 221.

Procured in dense scrub in February, Abor-Miri hills.

62. *Pteruthius melanotis melanotis*, Hodgs. [239].—Chestnut-throated, Shrike-Tit.

Abor-Miri hills. Beni, 16-2-06, ♂. Rungchilla, Yoloo Peak, 21-2-06, ♂ 5,000′ approximate elevation.

63. *Ægithina tiphia tiphia* (L.) [243].—Common Iora.

Throughout the plains. This Iora is found in cultivated tracts and secondary growth, partial to "sau" trees (*Albizzia stipulata*) on the outskirts of forest.

64. *Chloropsis aurifrons* (Temm.) [247].—Golden-fronted Chloropsis.

Locally distributed in the plains. Margherita, Likwa Jan; Dangri-Bramapootra Forest, Komolabari, Dhoolohat.

65. *Chloropsis hardwickii hardwickii*, Jard. and Selby [249].—Orange-bellied Chloropsis.

Common throughout the plains. More plentiful than *C. aurifrons*. A note records this *Chloropsis* as a fine songster.

66. *Irena puella* (Lath.) [254].—Fairy Blue Bird.

Throughout the plains and along the densely forested hills at their base on the north, possibly somewhat locally migratory, much more in the evidence towards the commencement of the rains. Dejoo, April, June, July (August immatures), Rungagora, May (August pair adults).

One record cold season. Panchnoi (base Daphla hills), 24-11-5, ♂.

67. *Mesia argentauris*, Hodgs. [257].—Silver-eared Mesia.

Descends to the foot of the hills in North Lakhimpur during the cold season in forest in large parties, frequents the light secondary growth around the "changs" in the Abor-Miri country.

68. *Minla ignotincta*, Hodgs. [258]—Red-tailed Minla.

Minla igneitincta, Oates, F. B. I. Vol. i., p. 245.

Descends the gorges of the rivers on the north frontier, frequenting the forest growth wherever the sun can penetrate to what patches the surrounding rocks give its rays access. Beni, Abor-Miri hills, Dejoo Gorge, Subansiri Gorge.

Iris pale stone yellow (naples yellow); bill upper mandible and tip of lower mandible blackish horny; lower mandible greenish horny at base; tarsus greenish yellow; soles yellow.

69. *Criniger flaveolus* (Gould.) [263].—White-throated Bulbul.

Very plentiful throughout the plains. A noisy vivacious Bulbul, found in parties in forest.

70. *Hypsipetes psaroides*, Vig. [269].—Himalayan Black Bulbul.

A hill species. Occurs sporadically in the plains during the cold season. This Bulbul no doubt wanders about the country in parties when the different fruits are ripe and flowers of their favourite trees are in bloom. Simal (*Bombax malabaricum*) when in flower prove a great attraction.

Rungagora (Plains), 20-3-04, ♀; Dejoo R., 26-4-03, ♂; Dejoo (base of hills), 15-2-09*, a party of a dozen or thereabouts and 19-2-09*, a party of twenty to thirty.

February is a month for local migration with some of the Bulbuls.

71. *Hemixus flavala*, Hodgs. [272].—Brown-eared Bulbul.

Sparingly distributed in the plains. Margherita, Panitola, Dejoo, Panchnoi Gorge, Beni.

In parties in February. A forest Bulbul, not as plentiful as *C. flaveolus*.

72. *Hemixus maclellandi* (Horsf.) [275].—Maclellands' Bulbul.

Plentiful in the Abor-Miri hills. One of the noisiest birds around our camp. A single secured at foot of hills in North Lakhimpur, Derpai 31-1-06, ♂; its loud notes attracted my attention.

Iris sienna brown; bill: upper mandible horny black; lower mandible pale horny; tarsus pale brownish horny.

73. *Molpastes bengalensis* (Blyth.) [282].—The Bengal Red-vented Bulbul.

A common specie throughout the whole district. A familiar bird everywhere excepting in heavy forest. Odd pairs seen at 4,000′ in the Abor-Miri hills on the north frontier. Dr. Falkiner had a partial albino specimen in his collection secured at Kharjan.

74 *Otocompsa emeria emeria* (L.) [288].—The Bengal Red-whiskered Bulbul.

Equally as common as *M. bengalensis* with a similar distribution. Found also in heavy forest frequenting the topmost branches of high trees in parties of a score or so during the cold season.

75 *Otocompsa flaviventris* (Tick.) [290].—The Black-crested YellowBulbul.

Occurs at the base of the hills plentifully. The farthest distance into the plains in North Lakhimpur that I have met with this Bulbul is Laluk, 1-3-10, although in Lower Assam I have obtained it at Gauhati on the Bramapootra, 12-2-11, ♂.

76. *Sitta cinnamoventris*, Blyth. [316].—The Cinnamon-bellied Nuthatch.

Distributed from the base of the hills and over the watershed, on the north frontier. Failed to meet with it in the plains. Margherita, Granditola (Subansiri Gorge). Runganuddie Gorge. Beni (Abor-Miri hills).

77. *Sitta frontalis*, Horsf. [325].—The Velvet-fronted Blue Nuthatch.

Throughout the plains, very partial to light forest growth and similar jungle in the more open beds of the hill rivers. A pair often seen in company with various *Phylloscopi*, &c.

Iris gamboge yellow ; orbital ring orange ; bill coral red ; tarsus reddish plumbeous, claws horny.

78. *Dicrurus annectans* (Hodgs.) [326].—The Crow-billed Drongo.
Two records only, evidently overlooked. Dejoo, 14-4-04, ♂ ; 21-7-04, ♀ .

79. *Dicrurus atra* (Herm.) [327].—The Black Drongo.
Plentiful along the base of the hills on the North frontier, several collected around Dejoo, Gogaldhubie. Its distribution is probably throughout the plains but requires to be worked out more thoroughly with specimens from dated localities.

Rungagora—From the windows of my bungalow overlooking the tea I saw a King Crow give chase to a butterfly, *Stichopthalma camadeva*, West, apparently without success. The Drongo made several darts which the butterfly evaded by dodging amongst the bushes ; this large and showy insect measures from $5\frac{3}{4}''$ to $6\frac{1}{4}''$ across the wings and is restricted to heavy forest. This particular insect had evidently lost its bearings and was making its way towards the forest on the opposite side of the Dibru when my attention was attracted by the manœuvres of the Drongo. If these occurrences did take place as frequently as some naturalists would have us believe to fit their theories. Is it not likely that those who have the advantage of actual observations every day of their life would be able to report many such incidents ? My experience is that instances of birds attacking butterflies are few and far between.

Dejoo, 9-6-10. This morning whilst watching a pair of King Crows molest a Serpent Eagle, *Spilornis cheela rutherfordi*, I saw one of them actually settle on the Eagle's back during its flight and force it to take refuge on the branch of a dwarf tree amongst some scrub jungle of a "hoolah." Here the Eagle was subject to repeated buffetings of this pair. Every assault caused it to duck or shift its head from side to side in a ludicrous fashion as it evidently was in fear with their persistent harassing.

80. *Dicrurus cineraceus nigrescens*, Oates, [329].—The Tenasserim Ashy Drongo.
Dicrurus nigrescens, Oates, F. B. I., Vol. i., p. 315.
Throughout the plains in the Dibrugarh district.

81. *Chaptia æneus* (Vieill.) [334].—The Bronzed Drongo.
Plentifully distributed throughout the whole area, frequently found on vegetation in the vicinity of water. This Drongo is a particularly fine songster.

82. *Dicrurus hottentottus hottentottus* (L.) [335].—The Hair-crested Drongo.
Chibia hottentotta, Oates, F. B. I., Vol. i., p. 320.
Throughout the whole area, partial to the outskirts of forest and grass land interspersed with Simal trees (*Bombax malabaricum*). These trees when in flowers prove a happy hunting ground for Drongos of all species.

83. *Dissemurus paradiseus grandis* (Gould.) [340 *part.*].—The Northern large Racket-tailed Drongo.
Dissemurus paradiseus, Oates, F. B. I., Vol. i, p. 325.
Similar distribution to *B. remifer*. Rungagora, 5 miles below, on Dibru, 14-3-03. I saw and heard this bird mimicking the calls of the two Cuckoos, *Cuculus micropterus* and *Eudynamis honoratus* in a perfect manner.
Iris red in adults, brown in immatures.

84. *Tichodroma muraria* (L.) [348].—The Wall-creeper.
Descends the gorges of the hills on the North frontier at the cold seasons, occurs sparingly, equally suited foraging on the face of a landslip or amongst boulders.
Subansiri Gorge, 25-1-05, ♀ (Pobha Mukh) ; Runganuddie Gorge, 10-11-

05*; Panchnoi Gorge, 23-11-05, ♂, 25-11-05; Joyhing Gorge, 3-1-05* Subansiri Gorge, 27-2-06* (Sifoo Mukh).

Iris dark brown; bill horny black; tarsus purplish black.

85. *Elachura punctatus* (Blyth.) [353].—The Spotted Wren.

Panchnoi R., Daphla hills, low elevations, 23-11-05, ♀, 24-11-05, ♂.

The above two records extend its range considerably in an eastern direction and the low latitude is significant, probably migratory to the extent of descending to lower limits during the cold season. Confined to Sikkim at high elevations. (Oates.)

86. *Pnœpyga pusilla pusilla*, Hodgs. [357].—The Brown Wren.

Throughout the plains in the cold season at all events, frequents the undergrowth in the forest and is by no means difficult of approach. Rungagora, Margherita, (Panchnoi, Dejoo, base of Daphla hills), Beni, Yoloo, Abor-Miri hills.

87. *Acrocephalus stentorea stentorea* (Hempr. and Ehr.) [363]. The Indian Great Reed-Warbler.

Hessamara, North Lakhimpur, 12-4-05, ♂.

Secured in heavy reed jungle at evening, single record only.

88. *Acrocephalus dumetorum*, Blyth. [366].—Blyth's Reed-Warbler.

Dejoo, base of hills, North Lakhimpur. The distribution of this Reed-Warbler is very imperfectly known, aquatic, procured also in bamboos adjacent to water in December.

89. *Acrocephalus agricola* (Jerd.) [369].—The Paddy-field Reed-Warbler.

In North Lakhimpur occurs at Bhimpoora bhil; Gogaldhubie, Boduti, Hessamara. Seen taking insects off or near the surface of the water on the "bhil" at Gogaldhubie, first seen on the "chopras" or grass lands around Hessamara, 10-1-05, a totally different habitat; again on 11-4-05 was particularly numerous, but I failed to meet with it in December that year in this same quarter.

90. *Orthotomus sutoria* (Forst.) [374]. The Indian Tailor-Bird.

Throughout the plains in its extreme limits, resident.

91. *Orthotomus atrogularis*, Temm. (375).—The Black-necked Tailor-Bird.

Occurs at Margherita. Failed to meet with it in North Lakhimpur. Specimens secured at the foot hills have all turned out to be *O. sutoria*.

92. *Cisticola tytleri*, Blyth. [379].—The Yellow-headed Fantailed Warbler.

Equally distributed throughout the whole area of the plains in suitable ground; at one time I never expected to find this Fantail Warbler away from the grass lands. Dejoo, 14-5-08, ♂* First observed at the foot of the hills pouring out its feeble notes from the tops of some reeds in one of the garden "hoolahs." Dejoo, August 1910. There has been quite an astonishing increase of its numbers since first seen. It has now firmly established itself in this garden. 1-5-10. Numbers singing gaily whilst soaring at this time. 17-8-10. Young about to leave the nest. This year has seen a prolonged nesting period. All species appear to have been very prolific or is it that there has been poor success with their first broods? Komolabari (Sibsagar); Dinjan plains (Dibrugarh). Iris pale sienna brown: bill fleshy horny; culmen dark; tarsus fleshy; claws horny fleshy.

93. *Franklinia gracilis* (Fankl.) [382].—Franklin's Wren-Warbler.

Resident; distributed throughout the plains.

Failed to meet with *F. rufescens* after careful observations. Iris ochreous yellow.

94. *Laticilla cinerascens* (Wald.) [387].—Day's Long-tailed Grass-Warbler.

Hessamara, North Lakhimpur. A fine series of this Grass-Warbler was collected hereabouts, it bears a striking superficial resemblance to *Prinia lepida*, although of large dimensions, most difficult to obtain amongst the dense grass and reeds which it frequents. As this means a short range shot. the usual difficulty arises how to obtain specimens without mutilating the skin and thus rendering it useless for preparation. December, January, April.

Iris sienna brown ; bill horny back or upper mandible dark bluish horny ; lower mandible pale bluish horny. Tarsus horny brownish. plumbeous or brownish slaty horny. These records extend its distribution considerably east. The types were secured at Dhubri, Lower Assam.

95. *Graminicola bengalensis*, Jerd. [388].—The Large Grass-Warbler.

Obtained in the grass lands around Dinjan (Dibrugarh), 22-3-03, ♀, and seen at other localities on the Bramapootra and Subansiri "churs." A great skulker and seldom shows itself. The crest feathers are distinctly spinous.

96. *Megalurus palustris*, Horsf. [389].—The Striated Marsh-Warbler "Tik tiki," Bengali.

Resident throughout the plains. The vagaries of this Marsh-warbler, as it rises and descends from and on to clumps of grass or reed jungle uttering a lively trill attract the attention of the most casual observer.

97. *Phragamaticola aedon* (Pall.) [393].—The Thick-billed Warbler.
Arundinax aedon, Oates, F. B. I., Vol. i., p. 393.

Possibly only locally distributed, four, all males curiously, obtained at Dejoo, North Lakhmipur, in more or less cultivated quarters. 17/20-4-07. Silonibari, 29-8-11* seen about 6-30 to 7-0 a.m. in the bungalow compound in the thick hedges and rose bushes, very windy last night, some rain. This record is apparently on its first descent of a cold weather migrant. Its song is very feeble.

Iris pale brown; bill, upper mandible, dusky horny, lower mandible fleshy; tarsus slaty plumbeous.

98. *Phylloscopus affinis* (Tick). [405].—Tickell's Willow-Warbler.

Generally distributed throughout the plains in the cold season at all events, partial to light open tree and scrub growth, never found in forest. Margherita, Rungagora, Hessamara, Derpai, Dejoo. Colouration of soft parts : Iris brown ; bill, upper mandible pale horny brown, lower mandible pale horny yellow ; tarsus olivaceous horny ; soles dingy-yellow. This last character is well marked.

99. *Phylloscopus fuliyiniventer* (Hodgs.) [409].—The Smoky Willow-Warbler.

Throughout the plains in the cold season, locally distributed owing to its habits as it is decidedly aquatic. Various weeds sedges and dead brushwood along the river banks afford it shelter and suit its requirements : keeps much to the ground and hops in and about these haunts in pairs. Plentiful in March, April. Rungagora (R. Dibru). This Warbler bears a close resemblance to *P. fuscata homeyeri*, and haunts similar localities.

100. *Phylloscopus fuscata fuscata* (Blyth) [410].—Dusky-Willow-Warbler.

Plentifully distributed during the cold season as late as the second week in May. Dejoo, North Lakhmipur, 7-9-08*, 11-9-10*, 28-9-10 ♀, 12-5-07, ♂. Numerous records intervening dates for various widely separated localities. Frequents low scrub and bushes. Often takes its food on ground. It flits rapidly from cover to cover when on the move.

The wing measurements vary somewhat as here given :—No. 235 15-10-03, ♂, 2·5″ ; No. 296, 4-5-03, ♀, 2·25″ ; No. 3458, 29-9-10, ♀, 2·2″—total length 4·8″, extent 6·8″, tail 1·6″, bill ·5″ ; tarsus ·9″.

H. S., Photo.

SUBANSIRI GORGE, LOOKING UP FROM BELOW POBHA MUKH.

H. S., Photo.

SUBANSIRI GORGE, LOOKING DOWN FROM HILLS ON RIGHT BANK ABOVE GANDITOLA.

Bill : upper mandible and tip of lower mandible dusty ; inside gape and rest of lower mandible yellow; tarsus olivaceous dusty; soles yellow.

101. *Phylloscopus fuscata homeyeri* (Dyb.) [410A].—Homeyer's Dusky Willow-Warbler.

This Willow-Warbler puzzled me for some considerable time until Dr. Hartert kindly went over my specimens and identified them as this form. Specimens secured at Rungagora, Komolabari and Dejoo in April; seen at Silonibari, 1-10-11*, 3-5-11*, 22-5-11*, so that its range is fairly extensive in the plains during the cold season. It is a difficult matter to discriminate between this northern form and the typical one, particularly when on the wing. Not previously recorded from within our limits. The types were described from Tigil in Kamchatka.

Very aquatic, partial to sedgy growth along the banks of streams and in the beds of "jans" or "nullahs".

102. *Phylloscopus maculipennis* (Blyth.) [413].—Grey-faced Willow-Warbler.

A single specimen secured in the Abor-Miri country; Beni, 17-2-06, ♀, 4,000′ approximate.

103. *Phylloscopus superciliosa superciliosa* (Gm.) [417].—Crowned Willow-Warbler.

Apparently locally distributed. Dibrugarh, 6-11-01, ♀ ; Margherita, 8-11-03, ♂.

104. *Phylloscopus proregulus newtoni*, Gätke. [415].
Phylloscopus proregulus, Oates, F. B. I., vol. i., p. 408.

Frequents the more open parts of the country, partial to light tree and scrub growth in the beds of rivers ; never found in the dense evergreen forests. Beni, Abor-Miri hills, 16-2-06, ♀ ; Gogaldhubie, 16-12-05, ♀; Derpai, 17-1-05, ♀; Hersamara, 18-1-05, ♂ ; Dejoo, 19-3-08, ♀, and other records.

105. *Phylloscopus trochiloides* (Sund.) [429].—Blyth's Crowned Willow Warbler.
Acanthopneuste trochiloides, Oates, F. B. I., Vol. i., p. 419.

Found in forest amongst the tree tops, not plentiful.

Rungagora, 13-4-03, ♀, and other records. Margherita, 29-11-03, ♀.

106. *Phylloscopus nitidus plumbeitarsus*, Swinh. [423].—Middendorff's Willow-Warbler.
Acanthopneuste plumbeitarsus, Oates, F. B. I., Vol. i, p. 414.

This Willow-Warbler commonly occurs throughout the plains.

Rungagora, 16-9-03, ♂; Dejoo, 11/12-9-10, ♂ ♂; Silonibari, 30-8-11, ♀, also procured at Gauhati, Lower Assam, 12-2-11.

107. *Cryptolopha affinis* (Horsf. and Moore) [431].—The Allied Flycatcher-Warbler.

Throughout the plains and occurs in the hills on the north frontier.

Panchnoi, Daphla hills (low elevations), 25-11-05, ♀; Margherita, Dibrugarh, 3-12-02, ♂ ; Beni, Abor-Miri hills, 12-2-06, ♀ ; Rungagora ; Dibrugarh, 13/16-3-03, ♂.

108. *Cryptolopha burkii burkii* (Burt.) [433].—The Black-browed Flycatcher-Warbler.

Throughout the plains in the cold season.

Margherita, 15-11-03, ♂; Dejoo, 26-11-07, ♂, 31-12-08, ♂; 15-4-07, ♀ ; Rungagora, 25-2-04, ♂.

Iris brown ; bill, upper mandible dusky, lower mandible dull yellow ; tarsus yellow ochreous.

109. *Cryptolopha burkii tephrocephalus* (Anders.) [432].—Anderson's Fly-catcher-Warbler.

Cryptolopha tephrocephala, Oates, F. B. I., Vol. i., p. 423.

A single record only, 14-3-03. R. Dibru, 5 miles below Rungagora in forest. Possibly the farthest western limit recorded in its range.

110. *Cryptolopha xanthoschistos jerdoni* (Brooks.) [435].—Brooke's Grey-headed Flycatcher-Warbler.

Cryptolopha jerdoni, Oates, F. B. I., Vol. i., p. 425.

Resident, partial to light forest, numerous records for various localities throughout the plains. Dejoo, 20-7-04, ♂, breeding; 26-6-04, ♂, juvenis. The young bird differs from the adult in its "paler" colouration.

111. *Cryptolopha poliogenys* (Blyth.) [436].—The Grey-cheeked Fly-catcher-Warbler.

Occurs around Margherita and the most plentiful of all these Fly-catcher-Warblers in the Abor-Miri hills. A large series collected around Beni, February 1906. Failed to meet with it in the plains.

112. *Cryptolopha castaneoceps* (Hodgs.) [437].—The Chestnut-headed Flycatcher-Warbler.

Distributed along the base of the hills and in the hills on the north frontier. One record for the plains.

Panchnoi, Daphla hills, low elevations. 24-11-05, ♂; 25-11-05, ♂; R. Dejoo, 18-11-10, ♂.

Beni, Abor-Miri hills, 4,000 feet approximate, 12-2-06, ♂; 20-2-06, ♂; R. Dibru, 5 miles below Rungagora, 13/16-3-03, ♀.

113. *Abrornis superciliaris*, Tickell. [440].—The Yellow-bellied Fly-catcher Warbler.

Resident under the hills on the north frontier at all events, sparingly distributed throughout the whole district in suitable localities, apparently plentiful around Margherita. Rungagora, 13-4-03. ♀; Dejoo, 4-7-04, ♂. juv. The young bird differs from the adult in its "paler" colouration.

114. *Abrornis albogularis*, Hodgs. [442].—The White-throated Fly-catcher Warbler.

Occurs throughout the plains from North Lakhimpur to Margherita in forest. Rungagora, 10-1-04, ♀; Chota Tingrai, 14-2-04, ♂; Derpai, 27-1-05, ♂; Margherita, November, December, January 1902-03, several specimens.

115. *Horornis fortipes fortipes*, Hodgs. [448].—The Strong-footed Bush-Warbler.

Apparently a cold season visitor to the plains.

Rungagora, Margherita, Ganditola (Subansiri Gorge), Dejoo, Gogaldhubie. Partial to bracken adjacent to water or interspersed amongst rocks.

Silonibari, 5-9-11*. first arrivals, Dejoo, 13-9-10*.

Iris light brown; bill dark horny; tarsus pale horny.

116. *Phyllergates coronatus* (Jerd. and Blyth.) [454].—The Golden-headed Warbler.

Possibly restricted to the terai at the foot of the hills and probably extends around the head of the valley. In North Lakhimpur, first noted at Dejoo, 19-11-07.* Several times seen in November 1906 on the Rajghur alli and Khuddam road near Seajuli and secured on the following occasions:—Dejoo, 13/14-12-07, ♀♀, 31-12-08, ♂; R. Dejoo, 18-12-10, ♂; Joyhing, 6-3-10, ♂; Margherita, 8-11-03, ♀, 28-2-03, ♀.

A prettily coloured attractive little warbler found in light forest growth, bamboo "baris" and occasionally in dense reed and grass beds in river "sutis" or channels; it has a loud call in comparison with its size.

Iris brown; bill horny black, edged with yellow at base; tarsus dull, yellow.

117. *Horeites brunnifrons* (Hodgs.) [455].—The Rufous-capped Bush-Warbler.

Throughout the plains in the cold season partial to thickets of bracken and reeds in low-lying land and along the banks of the rivers. Dejoo, 13-9-08 *; Silonibari, 26-10-11 *; first records for these years. Numerous records: November, December, January, specimens secured.

118. *Prinia lepida*, Blyth. [462].—The Streaked Wren-Warbler.

Confined to the "chopras" on the sandy "churs" of the large rivers. A series secured around Hessamara (Subansiri R.) in December 1905 and January 1906. Iris-ochreous yellow; bill bluish horny; tarsus fleshy; claws horny.

119. *Prinia flaviventris* (Deless.) [463].—The Yellow-bellied Wren-Warbler.

Resident throughout the plains; a series secured at Hessamara, Komolabari, Rungagora, Silonibari, 13-7-11; nest and four eggs, 16-9-11 four young.

Iris pale sienna brown, dark ochreous yellow; bill horny black-edged pale; tarsus yellowish fleshy, or pale yellowish horny.

120. *Prinia inornata inornata*, Sykes. [466].—The Indian Wren-Warbler.

Resident throughout the plains. In North Lakhimpur appears to be the predominant *Prinia* so far as the number of nests recorded at Dejoo prove. I have not had a single instance recorded of *P. flaviventris* nesting in this garden, whilst at Rungagora, north of Dibrugarh, equal numbers of both species was the general order.

Iris pale yellowish brown; bill slaty horny; lower mandible light horny brown; tarsus brownish fleshy; claws horny brown.

The various geographical races of this *Prinia* have been carefully gone into by Mr. Collingwood Ingram, "Novitates Zoologicæ," Vol. xix., pages 299 and 300. Since his notes have been published, Major H. H. Harington has further subdivided the form from Upper Burma, as *P. i. burmanica*, Bull. B. O. C., Vol. xxi., p. 111. My specimens judging from the descriptions appear to be nearest to the typical form.

121. *Lanius nigriceps* (Frankl.) [475].—The Black-headed Shrike.

Essentially restricted to grass lands and reedy wastes, which accounts somewhat for want of departure dates. These July and August records indicate the close proximity of its breeding haunts. The abnormal condition of the weather evidently being the inducement to descend to the foot of the hills. No departure dates available. Subject to a wide range in colouration; pale individuals are quite apparent on a casual observation. This species has a harsh chatter common to all shrikes. Dejoo, North Lakhimpur, 5-7-04, ♂, an unusual date in the rains; 23-7-08*, during a phenomenal dry spell of weather in a "hoolah". Silonibari, 13-8-11*, heavy rains in the hills, dirty weather. Dejoo, 18-8-10*, heavy rain night previous, low temperature, dull morning; Dejoo, 22-8-07*, during a phenomenal dry spell of weather; Dejoo, 25/26-8-10 (one of these records 25-8-10 may refer to the same bird, 18-8-10, although noted in a separate locality; the other refers to a record in a totally different direction, 26-8-10 and most improbable that it should be the same bird); 31-8-08*, the bird seen on 23-7-08, was joined this day by another which took up its quarters some short distance apart.

122. *Lanius schach tephronotus* (Vig.). [477].—The Grey-backed Shrike.

Lanius tephronotus, Oates, F. B. I., Vol. i., p. 465.

Numerous specimens collected during the intervening months of the cold season throughout the plains. About its time of departure in April and May is generally found in odd corners near the forest outskirts, otherwise a familiar bird near habitations and cultivated tracts.

Dejoo, North Lakhimpur, 30-8-08, ♂, ♀*, a pair in low scrub growth around bungalow, somewhat shunning observation. Silonibari, 25-8-11*; Dejoo, 7-9-10,* great heat at this time, evidently not much at ease, judging by its actions and open gape; another seen, 9-9-10*. Komolabari, Sibsagar, 20-9-04, ♂,♀; Dejoo, 16-4-07*, 24-4-10*, last noted, 3-5-10, cold, wet day; Silonibari, 5-5-11*, seen at two localities, outskirts of forest; Dejoo, 7-5-10*; Silonibari, 17-5-11*; forest clearance, 28-5-11*; wet at early morn, seen previously, 25-5-11.

123. *Lanius cristatus cristatus*, L. [481].—The Brown Shrike.

A true cold season migrant. With the exception of one somewhat doubtful record, 18-2-04, Chota Tingrai, I have failed to meet with this shrike in the plains proper.

Dejoo, North Lakhimpur (base of hills), 7-9-08*, first arrivals, noted daily afterwards, 11-9-10, ♂,* 19-9-07, ♂,♀; Silonibari, one, 4/5-9-11 ♂,♀.* (female noted, the day previous to the male); Dejoo, 17-4-07,* an odd bird, 29-4-10*. Noted on intermediate dates as follows: 16-4-10*, 24-4-10*.

124. *Hemipus picata capitalis* (McClell.) [485].—The Brown-backed Pied Shrike.

Hemipus capitalis, Oates, F. B. I., Vol. i., p. 472.

Throughout the plains in the cold season: somewhat sparingly distributed, Rungagora, Chota Tingrai, Margherita, Gogaldhubie, Beni (Abor-Miri hills).

Iris greenish brown, outer ring dark straw; bill black; orbital ring plumbeous black; tarsus plumbeous black.

125. *Tephrodornis pelvica pelvica*. (Hodgs.) [486].—The Nepal Wood-Shrike.

Occurs throughout the plains, its appearance is somewhat erratic.

Margherita (January), Dejoo, 24-4-03, ♂; 19-7-04, ♀; 4-9-08*, a large party; Rungagora, 16-2-02, ♀; 15-3-03, ♂,♀.

Iris olive green, bill dull light horny, tarsus bluish plumbeous claws horny.

126. *Pericrocotus speciosus*. (Lath.) [490].—The Indian Scarlet Minivet.

Distributed throughout the plains in the cold weather. Resident under the hills. Derpai, Dejoo, Gogaldhubie, Rungagora, Beni, Margherita.

127. *Pericrocotus brevirostris* (Vig.). [495].—The Short-billed Minivet.

Similar distribution as *P. speciosus*.

In one ♀ Dejoo, 15-3-08, the yellow plumage is replaced by orange.

A similar specimen noted amongst a party of normally coloured males and females on 2-2-10 at Dejoo, Rungagora, Nagaghoolie, Hessamara Seajuli.

128. *Pericrocotus solaris*, Blyth. [498].—The Yellow-throated Minivet.

A hill minivet, occurs sporadically in the plains.

Rungagora, 29-12-01, ♂; Beni, Abor-Miri hills, 7-2-06, ♂,♀.

129. *Pericrocotus rosea* (Vieill.) [499].—The Rosy Minivet.

Distributed locally throughout the plains. Rungagora, 29-3-03 ♂, 30-3-03 ♀, 6-4-02 ♂, ♀, Komolabari, 30-4-03 ♂; Dejoo, 15-4-07 ♂ ♂, 18-6-04 ♂, 22-6-10 ♀*, 22-3-10 ♂ ♀*. Not such a forest Minivet as the other species.

130. *Campophaga melaschistus melaschistus* (Hodgs.) [505].—The Dark-grey Cuckoo Shrike.

Campophaga melanoschista, Oates, F. B. I., Vol. i., p. 491.

Probably migratory; secured at Rungagora, November, January, February; Margherita, January, February; Panchnoi R, base of Daphla hills, November.

131. *Graucalus macei macei*, Less. [510].—The Large Cuckoo-Shrike.

A partial resident under the hills in North Lakhimpur, much more in evidence in the cold season, particularly so in the plains. Komolabari, August 1904 ♂ ♀; Gogaldhubie, 15-12-05 ♀; Maijan, April 1902 ♂ ♀; Dejoo, 5-3-09*; a party of eight, 6-9-08;* three in the vicinity of bungalow, they had been about for some days, very noisy. 22-4-10*; single 20-7-10,* a single bird, noted again the following months and at the end of August.

132. *Artamus fuscus*, Vieill. [512].—The Ashy Swallow-Shrike.

This Swallow-Shrike is a migrant. The following record for March and April and again in October move interesting data.

Thakurbari, Tezpur, Lower Assam, 15-3-11*, about fifty hawking for food at evening. Dejoo, North Lakhimpur, 5-4-10*; Rungagora, Dibrugarh, 16-4-03, ♂; Silonibari, North Lakhimpur, 25-4-11*, half a dozen in palm tree (*Caryota urens*, L.). A party seen at Thurbo in the Darjeeling district on or about 18-4-11*; Komolabari, Sibsagar, 15/25-9-04 ♀; Dejoo, North Lakhimpur, 3-10-10*, a pair near bungalow; Silonibari, Lakhimpur, 3-10-11*, heavy rain about 10 a.m.

I have made no other records for intervening dates, these records correspond to the period when the south-west monsoon bursts and its termination, they certainly appear to be absent during the months of heavy rain, though they undoubtedly nest in this area.

133. *Oriolous melanocephalus*, L. [521].—Indian Black-headed Oriole.

"Hokhi, hoti," Assam.

Resident in North Lakhimpur, although not much in evidence during the rains, throughout the plains in the cold season.

Rungagora, November, January, February, March; Komolabari, August: Dejoo, February, May, (juv.) July.

Dejoo, 11-5-10*, a pair in evidence, nowadays singles more often noted possibly nesting in the vicinity, Dejoo, 11-9-10. The male surpasses in compass the female with his rich liquid notes, though the endeavours of the female are by no means feeble in this direction, yet the difference is appreciable. These productions are generally uttered as the male bends low with the tail outspread to its full extent. This pair had been in this vicinity throughout the rains.

134. *Oriolus traillii* (Vigors) [522].—The Maroon Oriole.

Fairly plentiful along the terai of the heavily forested hills in North Lakhimpur, but nowhere common; Dejoo (December, January, April); Margherita (August).

Iris naples yellow; orbital skin plumbeous; bill pale-blue; tarsus slaty.

135. *Gracula javana intermedia*, Hay. [524].—The Indian Grackle.

Eulabes intermedia, Oates, F. B. I., Vol. i., p. 511.

Resident under the hills in North Lakhimpur, extends its range into the plains in the cold season; and although nesting throughout the plains and at the base of the hills is possibly more plentiful at this latter locality at the nesting period. It appears to be a local migrant, as parties are constantly observed on the move in the cold season. Guijan (Dibrugarh District), July; Margherita, February; Dejoo, July, August, November; Maijan, April. Dejoo, 20-1-09, I counted thirty hill Mynahs in some

scrub jungle adjacent to my bungalow; 3-3-09, parties of hill Mynahs still in evidence at evening seen hawking for termites. Dejoo and Joyhing, 11-3-09, still in small numbers; 25-1-10, I counted eleven around my bungalow this morning; 23-4-10, ten flew overhead this morning in a corner of the garden, calling at the time, eventually settling in a tall tree in the adjacent forest. Dejoo, 10-5-10, both hear and see these hill Mynahs at intervals; Silonibari, 26-2-11, about thirty in one party flying over the bamboo "baris" near the North Lakhimpur "cutcherry."

136. *Saroglossa spilopterus* (Vig.) [261].—The Spotted-wing.
Psaroglossa spiloptera, Oates, F. B. I., Vol. i., p. 249.

Found throughout the plains in the cold season. Gregarious, a typical Starling in its habits, frequents the tops of the forest trees. Margherita. Rungagora, December; Dejoo, 21-6-04, ♀; Lilabari, 12/13-9-05.

Flocks congregated with *Æthiopsar fuscus* and *Sturnia malabaricus* on the branches of the high trees left standing in the "pothar" land used for rice cultivation.

Dejoo, 24-9-07, large flocks congregated on the bare branches of a prominent tree in a corner of the garden, 2-10-07, a flock of about four hundred estimated in a forest clearance intermingled with some few *Sturnia malabarica*, they were occupied bathing in a stream and sunning their plumage on some trees alongside; Dejoo, 7-9-08, flocks near the woodstack in forest clearance, again noted on 13-9-08.

137. *Sturnia malabaricus* (Gm.) [538].—The Grey-headed Myna.

Distributed throughout the plains.

Resident; Chota Tingrai (Tinsukia). 18-2-04, observed an albino amongst a party of normally coloured birds, windy morning, and as they were very wary gave no chance of a shot.

138. *Acridotheres tristis tristis* (L.) [549].—The Common Myna.

Common in the vicinity of habitations.

139. *Æthiopsar fuscus* (Wagl.) [552].—The Jungle Myna.

Throughout the whole district.

140. *Sturnopastor contra contra* (L.) [555].—The Pied Myna.

Similarly distributed to the other common Mynas.

Sturnus menzbieri is recorded by Oates as far east as Dibrugarh. Failed to meet with it with the exception of one very doubtful record. More evidence of its status is desirable.

141. *Siphia strophiata*, Hodgs. [560].—The Orange-gorgeted Flycatcher.

Beni, Abor-Miri hills (north frontier), 7-2-06, ♂; Runganuddie Gorge, base of hills, north frontier, 16-2-09, ♂.

Occurs at Margherita, absent from the plains. The Runganuddie record is the only data available for North Lakhimpur. The exact locality was a defile on the right bank at the mouth of the Gorge.

Hartert has dispensed with Oates' numerous genera for the *Muscicapidæ* and unites *Hemichelidon*, *Siphia*, *Cyornis*, *Digenea*, *Stoparola*, amongst others into one genus *Muscicapa*. Palæarctic Birds, Vol. i, p. 473.

Stresemann has recently revised this family, Novitates Zoologicæ. Vol. XIX, p. 323, and recognizes the following genera which come under observation in this paper.

Siphia, *Erythrosterna*, *Mucicapula*, *Dendrobiastes*, *Digenea*, *Anthipes*, *Cyornis*. These generic names are here used.

142. *Erythrosterna parva albicilla* (Pall.) [562].—The Eastern Red-breasted Flycatcher.
Siphia albicilla, Oates, F. B. I., Vol. ii, p. 10.

Dejoo, North Lakhimpur, 13-9-08, ♂; Immature; 25-9-08.* Females plentiful about this time with the exception of the single male previously recorded, no others of this sex noted, 17-9-07*. Silonibari, North Lakhimpur, 17-9-11*; Komolabari, Sibsagar, 15/25-9-04, ♀; Dejoo, 2-10-10, ♂, 19-10-10*, ♀ or ♂ immature; Rungagora, Dibrugarh (Plains), 17-1-04, ♂; Silonibari, 17-4-11*, ♂; Dejoo, 20-4-07, ♂, several seen, four days previously. Dejoo, 28-4-03, ♂, 25-4-10*.

One of the earliest arrivals in the cold season in North Lakhimpur, after a brief stay, disappear to return with the advent of the rains; mostly immature birds noted as first arrivals. Iris hazel brown; bill dusky; tarsus dusky black.

143. *Cyornis cyanea* (Hume) [564].—The White-tailed Blue Flycatcher.

Apparently occurs within our limits in the north-east above Margherita.

144. *Erythrosterna hodgsonii* (Verr.) [565].—The Rusty-breasted Blue Flycatcher.

Cyornis hodgsoni, Oates, F. B. I., Vol. ii., p. 14.

Joyhing Gorge, North Lakhimpur, 19-3-05, ♂. One or two others seen about the same quarter at this time of year in the stony bed of the river searching for insect food amongst the boulders.

145. *Dendrobiastes hyperythra hyperythra* (Blyth.) [566].—The Rufous-breasted Blue Flycatcher.

Cyornis hyperythra, Oates, F. B. I., Vol. ii., p. 15.

Chota Tinrai, Tinsukia (Plains) 14-2-03 ♂; Panchnoi R., Daphla hills, low elevations, 28-11-05 ♂ ♀; Dejoo, North Lakhimpur, 26-3-10*, in bamboo "bari."

Occurs throughout the plains in the cold season, somewhat sparingly in forest, Rungagora (Gurrung Jan), occasionally; apparently plentiful at Margherita.

146. *Digenea leucomelanura leucomelanura*, Hodgs. [567].—The Slatyblue Flycatcher.

Cyornis leucomelanurus, Oates, F. B. I., Vol. ii., p. 16.

Rungagora, Dibrugarh (Plains), 13-12-03, ♂, 13-4-03, ♀; numerous records and specimens secured on intervening dates. Gogaldhubie, North Lakhimpur (Plains), 12-1-05, ♂. Throughout the plains in the cold season; seen on occasions in low-lying ground covered with dense thickets of reeds, "tora pat" growth at Dejoo; such localities are its typical haunts.

147. *Muscicapula melanoleuca melanoleuca*, Blyth. [569].—The Little Pied Flycatcher.

Cyornis melanoleucus, Oates, F. B. I., Vol. ii., p. 18.

Dejoo, North Lakhimpur, 12-12-07, ♂; attracted by its feeble call; secured at evening during a cold wet spell of weather. Undoubtedly rare, as this is the only record.

148. *Cyornis unicolor*, Blyth [574].—The Pale-blue Flycatcher.

Dejoo R. Gorge, higher reaches; Daphla hills, low elevations, 4-12-04, ♂.

149. *Cyornis rubeculoides* (Vigors) [575].—The Blue-throated Flycatcher.

Lilabari, North Lakhimpur, 7-9-07*, ♂; Dejoo, North Lakhimpur, 11-9-10*, 31-3-07, ♂, 2-4-07, ♀, 21-4-03, ♂, 23-4-03, ♀, and other dates for April 1903, June and July 1904.

Occurs in North Lakhimpur at the base of the hills, much more in evidence before or at the commencement of the rains at the nesting period. Undoubtedly migratory, as it is absent in the cold season: restricted to forest.

150. *Cyornis magnirostris,* Blyth. [577].—The Large-billed Blue Flycatcher.

Beni, Abor-Miri hills; north frontier, 4,000′, approximate elevation. 8-2-06, ♂, single record.

151. *Nitidula hodgsoni* (Moore) [578].—The Pigmy Blue Flycatcher.

Rare. The following records noted at Dejoo, base of hills, North Lakimpur, 13-3-05, ♂; there had been a week's heavy rain previously; another male observed on the following day. 26-11-07, ♂* (Rajghur). The note of this Flycatcher is a feeble "tsip"

Iris brown; bill black; tarsus and claws pinkish plumbeous horny.

152. *Muscicapa melanops,* Vig. [579].—The Verditer Flycatcher.
Stoparola melanops, Oates, F. B. I., Vol. ii, p. 28.

Distributed throughout the plains. Records for Rungagora, February. March; Dejoo and Joyhing, January, February, March. Apparently absent during the rainy season or only locally distributed; occasionally seen in parties as on 26-3-07, Dejoo, when a party of a dozen or thereabouts noted at edge of some forest. Procured at Gauhati in Lower Assam, 12-2-11, ♂. Favours the open tracts of country. Often seen in the vicinity of dwellings.

153. *Anthipes poliogenys* (Brooks) [586].—Brooks' Flycatcher.

Plentifully distributed throughout the plains during the cold season nesting under the hills. Margherita, November, December, January: Rungagora, October, December; Derpai, January; Dejoo, December, January, April, August, September, October.

Somewhat resembles a robin as it hops over and about fallen stumps and brushwood in forest, although it generally keeps much above the ground amongst trees; it utters a pleasing trill.

154. *Culicicapa ceylonensis ceylonensis* (Swains.) [592].—The Grey-headed Flycatcher.

Occurs throughout the plains. Margherita, January; Rungagora, January, April; Gogaldhubie, December; Derpai, January; Beni, Abor-Miri hills, February.

155. *Niltava grandis* (Blyth.) [593].—The Large Niltava.

Absent from the plains. Found at the base of the hills in North Lakhimpur in the cold season and probably extends around the head of the valley as it is plentiful at Margherita.

156. *Niltava sundara,* Hodgs. [594].—The Rufous-bellied Niltava.

Distributed throughout the plains during the cold season; plentiful at Margherita, November, December, January, February, March; Rungagora. January, February; Dholong R., foot of hills north Lakhimpur, January. Restricted to forest.

157. *Niltava macgrigoriæ* (Burton) [595].—The Small Niltava.

Occurs throughout the plains in the cold season. Margherita, November, December: Rungagora, November, January; Dejoo, March: Dholong R., North Lakhmipur, January, February.

More partial to mixed heavy reed and grass jungle interspersed with trees than strictly forest land.

158. *Tchitrea paradisi affinis,* Blyth [599].—The Burmese Paradise Flycatcher.

Terpsiphone affinis, Oates, F.B.I., Vol. iii., p. 47.

Occurs throughout the plains sparingly, more particularly plentiful at the base of hills around the head of the valley. This Flycatcher arrives with the advent of the monsoon. No records available for the cold season

months. Margherita, 5-4-03, ♂; Rungagora, Dejoo, 27-3-05, ♂, 31-3-07, ♂, May, July.

To be met with in parties to the extent of a dozen or thereabouts in late March and April at the foot of the North Lakhmipur hills.

159. *Hypothymis azurea styani* (Hartl.) [601 *part*].—Styan's Black-naped Flycatcher.

Hypothymis azurea, Oates, F.B.I., Vol. ii, p. 49.

Plentiful at the base of the hills, North Lakhimpur ; Dejoo, 2-4-03, ♂, 24-3-10*, 25-3-07*; numerous records, April, May, June, August ; Rungagora, 29-3-03, ♀.

Dejoo, 8-0-08, several in some nurseries, most probably an adult pair with this year's brood. No records for the cold season months, which points to this flycatcher arriving preparatory or at the advent of the monsoon.

160. *Chelidorhynx hypoxantha* (Blyth) [603].—The Yellow-bellied Flycatcher.

Chelidorhynx hypoxantha—Oates, F. B. I., Vol. ii, p. 51.

Descends the gorges to the base of the hills and extends into the plains during the cold season as far as the Dibru R. at all events. Rungagora, January, February: Gogaldhubie and Hessamara, December ; Derpai and Poobamukh, Subansiri Gorge, January ; Dejoo, December, January : Panchnoi R. low elevations, Daphla hills, November ; Beni, Abor-Miri hills, February ; Harmutty, November. Frequents the tops of the trees in some numbers in February in company with various *Phylloscopi*, Beni, 1906. Oates states the sexes are alike ; males can be distinguished at a glance. The lores, feathers round the eye, cheeks and ear coverts are considerably darker in the male, whilst the band on the forehead is also a deeper yellow tint in this sex.

161. *Rhipidura albicollis* (Vieill.) [605].—The White-throated Fantail Flycatcher.

Plentifully distributed throughout the whole area.

162. *Saxicola torquata stejnegeri* (Parrot) [610].—Stejneger's Bush-Chat.

Pratincola maura, Oates, F.B.I., Vol. ii., p. 61.

All the Bush-Chats in my collection belong to this eastern form though *S. t. przewalskii*, Pleske, is also recorded from Assam. Occurs throughout the whole tract of country during the cold season, confined to grass lands and open cultivated places. The August dates noted at the foot of the North Lakhimpur hills point to the close proximity of its breeding haunts. Dejoo, 20-8-07*, abnormal atmospheric conditions, very dry August ; 27-8-10, ♂ Im.*; 30-8-10, ♀*; 29-8-08, ♂ Im. or ♀*; next occurrence :— 11-9-08*; 30-8-10, ♀*, Silonibari, 31-8-11, ♂ & ♀* in different localities ; Komolabari, 7-9-04, ♂, many collected during the early days this month ; Dejoo, numbers in evidence after rain, 10-10-10 ; Hessamara, 11-4-05, ♂ Rungagora, 16-4-03, ♂ ; Silonibari, 18 & 19-4-11*, wet morning ; three or four in a patch of grass land ; Bipuria, 10-4-11*; Dejoo, 25-4-10.*

Other localities—Margherita, Nudwa, Dibrugarh. Failed to meet with *S. caprata*, evidence required as to this Chat's status in Upper Assam if it really does occur.

163. *Saxicola leucura* (Blyth) [611].—The White-tailed Bush-Chat.

Pratincola leucura, Oates, F.B.I., Vol. ii., p. 63.

Confined to the grass lands more than *S. t. torquata*, both species may be found together, although *S. leucura* keeps to the outer limits of these haunts. On the north bank of the Bramapootra noted at the following localities and on these dates: Hessamara, December, January, 12-4-05, ♂ ; Bipuria, 10-4-11*; Pathalipam, 12-1-06, ♂*; Derpai, 14-1-06, ♂ ; Subansiri R. ; Boduti, 23-3-09 ♂*.

Dhunsirimukh, south bank of Bramapootra, 14-3-11* again on 8-4-11* a few pairs still in evidence. A few pairs possibly remain to nest in the plains, but the great majority, no doubt, return to the hills. Their haunts in the rains if some odd birds do remain are almost inaccessible and in any case would require the expenditure of much trouble and inconvenience to satisfy oneself beyond doubt on this score, though some eggs in my possession are either this or the former chat but most probable *S. leucura*, and were taken at Hessamara.

164. *Oreicola jerdoni*, Blyth [614].—Jerdon's Bush-Chat.

Resident as a nesting species in North Lakhimpur, occurs throughout the plains in the cold season. Nagaghoolie, December ; Rungagora, December. March, 8-4-03, ♂. Confined to reed and grass lands adjacent to the rivers.

165. *Oreicola ferrea ferrea* (Gray) [615].

Distributed throughout the plains in the cold season when it is often gregarious to the number of a dozen or thereabouts. Partial to the outskirts of forest. Margherita, November, December, January, February ; Rungagora, March ; Nagaghoolie, December ; Chota Tingrai, February ; Beni, Abor-Miri hills, February ; Dejoo, November, December, March.

166. *Enicurus maculatus guttatus*, Gould. [631].—The Eastern Spotted Forktail.

Henicurus guttatus, Oates, F. B. I., Vol. ii., p. 84.

Occurs on the north side of the watershed only in the hills on the North Frontier, specimens secured in February. Kotur stream, Beni, Abor-Miri country.

167. *Enicurus schistaceus*, Hodgs. [632].—The Slaty-Backed Forktail

Henicurus schistaceus, Oates, F. B. I., Vol. ii., p. 84.

Occurs on the north and south side of the watershed in the hills on the North Frontier, it does not extend into the plains, but is found on both sides of the valley and probably has a continuous range around the hills at the head of the valley. Panchnoi, R. Dejoo, R. Joyhing, R. Kotchin stream, Beni, Abor-Miri country; Margherita.

168. *Enicurus immaculatus*, Hodgs. [633].—The Black-backed Forktail.

Henicurus immaculatus, Oates, F. B. I., Vol. ii., page 85.

Found throughout the plains. Occurs in jungle streams and the lower reaches of stony beds of the hill rivers. The only Forktail confined to the level area. Dejoo R., Joyhing R., Rungagora, Panitola, Margherita.

169. *Enicurus leschenaulti indicus*, Hart. [634].

Henicurus leschenaulti, Oates, F. B. I., Vol. ii., p. 86.

Distributed in the hill streams and rivers around the head of the valley, extends some miles distant into the plains during the cold season in North Lakhimpur. This sprightly Forktail occasionally favours the vicinity of a bungalow in the dry cold weather months, on one such occasion noted 26-9-11, at Silonibari.

170. *Microcichla scouleri* (Vig.) [637].—The Little Forktail.

Confined to the hill rivers around the head of the valley, odd birds may be met with on the farthest "gagris" rapids of the North Lakhimpur rivers, as this Forktail is never found away from such haunts: the termination of the fast flowing water is invariably the extreme limit of its range. The following records constitute the sum total of occurrences:—

Runganuddie Gorge, 8-11-05, ♂ ♂; Dejoo, R. Gorge, 11-12-04, ♀; Runganuddie, Dekajuli. 5-3-10*; Joyhing R., 3-1-05 ♀; Subansiri Gorge. Sifoo Mukh, 2-2-06, ♀ ♀; Subansiri Gorge: Ganditola, 26-1-06, ♀.

171. *Chaimarrornis leucocephala* (Vig.) [638].—The White-capped Redstart.

Confined to the hill rivers around the head of the valley. In North Lakhimpur in the cold season occasionally may be found some distance away in the plains. In April 1903, I noted several about the deep pools of stagnant water along the Komolabari road, wet weather at this time. In April 1904 none were to be noted in the beds of either the Dejoo or Runganuddie and must have gone farther back. Two specimens secured, 12th, 13th March 1906, were in process of moult, in one minus the tail, in the other the crest feathers wanting.

172. *Chaimarrornis fuliginosa fuliginosa* (Vig.) (646).—The Plumbeous Redstart.

Rhyacornis fulginosus, Oates, F.B.I., Vol. ii., p. 98.

Occurs in all the hill rivers at the foot of the hills around the head of the valley, absent from the plains. Specimens procured on both sides of the watershed on the north frontier, 7-11-04, ♂ ♀; Dejoo R., 5-3-05, ♀ ; Runganuddie, November to March numerous records.

Dejoo, 27-11-10, a pair of males were vying with each other in their endeavours at song whilst taking periodical flights at short intervals a few inches above the fast running water with expanded tails, always returning to their point of vantage in some overhanging creepers which were partially immersed in the river.

173. *Phœnicurus aurorea leucoptera*, Blyth (641).

Ruticilla aurorea, Oates, F.B.I., Vol. ii., p. 93.

Cold season migrant. Generally distributed in the cold season months throughout the whole districts of Lakhimpur and Sibsagar and is the predominant Red-start. Frequents the vicinity of compounds and cultivated areas on its arrival and is a familiar and welcomed visitant.

North Lakhimpur, P. O. Station headquarters, 28-10-11, ♂*; 30-10-1911, ♂ ♀*; Silonibari; Dejoo, 29-10-10, ♀*; Dhoolohat, 31-10-10, ♂*; Dejoo forest clearance foot of hills, 9-11-08, ♂*; Rungagora (Plains), 13-11-01, ♂ ; Dejoo, 16-11-04, ♂ ; Dejoo, 13-11-04, ♀ ; North Lakhimpur, 21-11-05, ♂ ; Dejoo, 12-4-10 ♀*.

174. *Phœnicurus hodgsoni*, (Moore.) (643).—Hodgson's Red-start.

Ruticilla hodgsoni, Oates, F.B.I., Vol. ii., p. 95.

Occurs at irregular intervals in the cold season throughout the plains. These records constitute the whole of the evidence as to its status.

Dejoo, 3-11-08, ♂*; Dejoo, 20-11-10, ♀ ; Joyhing, 20-11-10, ♀*; R. Dejoo, 18-12-10.* Numerous in the stony bed of the higher reaches of the river, only females noted at the time ; Dejoo, 4-12-10, ♂*; Rungagora, 3-1-03, ♀; Dholong Mukh, 19-1-06, ♂*; Derpai, 26-1-06*; two noted in small patch of ground surrounded by forest; Joyhing, 23-1-08 ♂ ; Derpai, 27-1-05, ♂ ; 29-1-05, ♀; Rungagora, 7-2-04, ♂; Joyhing, 8-3-11, ♂ ♀*; Dejoo, 19-3-08, ♂; Nagahoolie, 27-3-04, ♂.

175. *Phœnicurus ochruros rufiventris* (Vieill.) (644).—The Indian Redstart.

Ruticilla rufiventris, Oates, F. B. I., Vol. ii, p. 95.

A cold season migrant, apparently passing over the district lying at the foot of the hills on the north frontier at its descent to the plains as with one exception the sum total of records denote its return at the commencement of the hot weather, procured at Gauhati, Lower Assam, 12-2-11, ♂.

Dejoo, 23-3-10, ♂*; wet spell of weather. 26-3-10, ♂ ; this bird was in a fat condition ; 7-4-08, ♂*, south side of river; Rungagora, 9-4-03; Hessamara, 9-4-05, ♀; Rungagora, 11-4-03, ♂; R. Dejoo, base of hills, 16-4-04, ♂ ♂, in river bed, base of hills; Dejoo, 18-4-08, ♂; Dejoo, 22-4-10, ♀*; Dejoo, 25-4-10, ♀*; Derpai, 14-1-06, ♂ as this locality is at the entrance of the Subansiri Gorge, this bird may have been a late arrival or spending the cold weather in these quarters.

176. *Luscinia svecica robusta* (Buturlin.) [647].
Cyanecula suecica, Oates, F. B. I., Vol. ii., p. 99.

A cold season migrant; the following records are the sum total in data of its appearances:—

Dejoo, 14-9-08*; Komolabari, 20-9-04, ♂; Dejoo, 5-10-08*, an influx about this date, 8-10-08, numbers noted in scattered localities; Dejoo, 9-10-08, ♀; Silonibari, 14-10-11 *; Dejoo, 18-10-10 *, two noted; Rungagora, 31-1-04, ♂, a rare event, female noted a few days later; Dejoo, 5-3-10, ♀, two noted yesterday; Komolabari, 1-5-03, ♂.

Easily overlooked owing to its habit of keeping to the ground, when it does rise the chestnut markings as it expands its tail in flight serve as a sure means of identification, partial to grass lands, occasionally haunts swampy ground covered with rank weeds.

177. *Luscinia calliope* (Pall.) [650].—The Common Ruby-Throat.
Calliope camtschatkensis, Oates, F.B.I., Vol. ii, p. 102.

An irregular cold season visitor to the plains.

Dejoo, 19-9-07, ♀*; Dejoo, 8-9-08*; Dejoo, 14-11-10*; Rungagora, 9-4-03, ♂; Dejoo, 17-4-07, ♂; first noted, 15-4-07; 18-4-07, ♂.

Iris brown; bill dusky, pale at base of lower mandible; tarsus pale dusky fleshy.

178. *Luscinia pectoralis tschebaiewi* (Przew). [652].—The Tibet Ruby-Throat.
Calliope tschebaiewi, Oates, F.B.I., Vol. ii., p. 104.

Silonibari, 6-9-11 *; Dejoo, 15-9-08, ♂ *; Silonibari, 19-9-11, ♀ *; Dejoo, 21-9-07, ♂*; Dejoo, 25-9-10*; Dejoo, 6-10-07, ♂. Numerous occasions noted after this record this month and onwards 8-10-08*; Rungagora, very numerous in December and January 1903-4; procured at Hessamara, 28-12-05, ♂; latest dates Hessamara, 13-3-05, ♂; Rungagora, 24-4-03, ♀.

The common Ruby-throat throughout this district in the cold season. During the day it keeps to the ground, only at early morn the male may be seen uttering its weak yet pleasing trill from the top of a bush or shrub when its richly coloured throat is a prominent character, otherwise seldom seen although not easily disturbed.

Iris brown; bill and tarsus horny black.

179. *Tarsiger rufilatus* (Hodgs). [654].—Red-flanked Bush-Robin.
Ianthia rufilatus, Oates, F. B. I., Vol. ii., p. 106.

Procured in the Abor-Miri hills on the north side of the watershed and at the foot of the hills in North Lakhimpur in the upper reaches of the Joyhing river, 12-2-05, ♂ 19-2-05, ♀; Beni, Abor-Miri hills, 7-2-06, ♀, 8-2-06, ♀, 18-2-06, ♂.

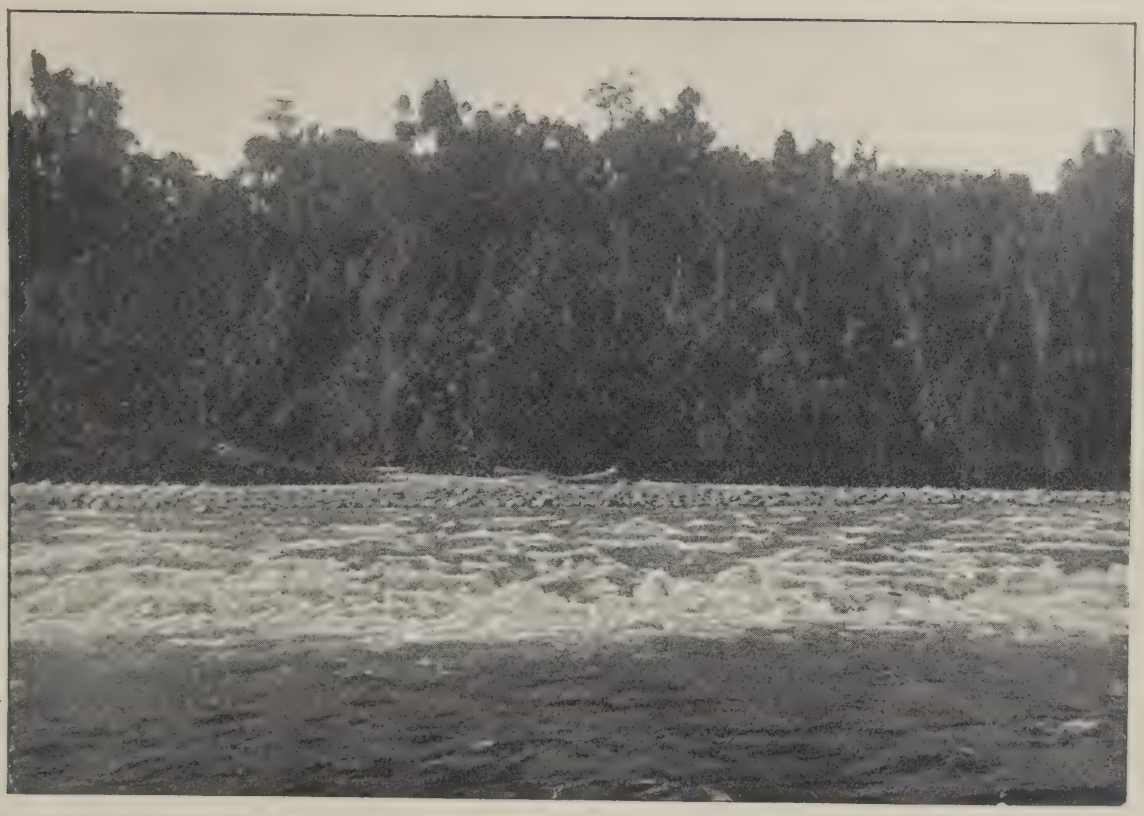
Frequents the light growth in the beds of the river and around the "changs" in the hills and does not shun observation as the Blue-throats and Ruby-throats.

180. *Tarsiger hyperythra* (Blyth.) [656].—Rufous-bellied Bush-Rubin.
Ianthia hyperythra, Oates, F. B. I., Vol. ii., p. 108.

Procured at Beni, Abor-Miri hills, north frontier, 8-2-06, ♀ 9-2-06, ♀.

181. *Notodela leucura* (Hodgs.) [659].—The White-tailed Bush-Robin.

Throughout the plains in the cold season in forest, also in the dense bamboo and mixed growth on the hill sides. It feeds a good deal on or near the ground; when disturbed it flies into the higher vegetation or takes up its position on a sapling.



H. S., Photo.

"GAGRI" OR RAPIDS, RUNGANUDDIE GORGE.

Haunts of *Cinclus pallasii tenuirostris*, *Microcichla scouleri*, *Ceryle lugubris guttulata*, *Ibydorhyncha struthersii*, &c., &c.

H. S., Photo.

LANDSLIP ON THE PANCHNOI, DAPHLA FOOT HILLS.

Haunts of *Tichodroma muraria*, *Alcedo grandis*, *Ardea insignis*, &c., &c.

182. *Copsychus saularis saularis* (L.) [663].—The Magpie Robin.
A familiar resident in the vicinity of habitations and cultivation.

183. *Kittacincla macrourus macrourus* (Gm.) [664].—The Shama.
Cittocincla macrura, Oates, F. B. I., Vol. ii, p. 118.

Somewhat sparingly distributed in the plains; more plentiful at the base of the hills; partial to dense secondary growth; nullahs in forest, Rungagora; two or three occasions; Margherita, November; Denpai, January; North Lakhimpur, July; Dejoo, November, March: Gauhati, Lower Assam, 12-2-11, ♂ ♂.

It utters some melodious notes resembling the syllables "da" "di" "di" "di," repeated several times and shuns observation.

184. *Turdus albocinctus* Royle. [672].—The White-collard Ouzel.
Merula albocincta, Oates, F. B. I., Vol. ii, p. 127.

Dejoo, North Lakhimpur (base of hills), 15-3-08, ♀, single record.

Distribution as given by Oates: Himalayas, Eastern Kashmir to Sikkim. Iris bright brown; orbital skin yellow ochreous; bill dull yellow: tarsus dirty yellow.

185. *Turdus castanea castanea* (Gould.) [673].—The Grey-headed Ouzel.
Merula castanea, Oates, F. B. I., Vol. ii., p. 128.

Dejoo, North Lakhimpur (base of hills, 4-3-05, ♂, single record; this bird had been in the vicinity for three weeks.

Distribution as given by Oates: Murree to Sikkim. "Griffith appears to have obtained it in Assam." Iris hazel brown; bill dusky yellow; orbital ring yellow; tarsus dark yellow horny; claws horny.

186. *Turdus ruficollis ruficollis*, Pall. [675].—The Red-throated Ouzel.
Merula ruficollis, Oates, F. B. I., Vol. ii., p. 130.

Records for the plains as follows: Rungagora, 5-4-03 ♀; 11-4-03, ♂; Pathalipam 6-3-06, ♂; Dejoo, 14-3-08, ♀ 1-2-09.*

Gregarious in parties to the number of twenty or thirty individuals though my specimens in most cases, procured at intervals, have been scattered odd birds. This Blackbird is evidently much more plentiful in the eastern portion of its cold weather area. During a six months' sojourn in the cold season months 1911-12 on the Nepal-Sikkim Frontier, *T.r.atrogularis* was much more frequently met.

187. *Turdus boulboul* (Lath.) [676].—The Grey-winged Ouzel.
Merula boulboul, Oates, F. B. I., Vol. ii., p 130.

Dejoo, North Lakhimpur (base of hills 31-3-07, ♂; forest clearance, Seajuli, 25-11-11 ♂. Two records. (previously obtained in the Bhutan Doars, Oates).

Iris brown; gape and orbital skin yellow; bill orange; tarsus dul. yellow ochre.

188. *Turdus ruficollis atrogularis* Temm. [677].—The Black-throated Ouzel.
O. & B., Vol. ii., p. 131.
Merula atrigularis, Oates, F. B. I., Vol. ii., p. 131.

Records for the plains as follows: Nagaghoolie 31-1-04, ♀; Margherita. 31-1-04, ♀, 17-2-03, ♂; Dejoo, 14-2-04, ♀; 19-2-05, ♂.

In North Lakhimpur, if anything, this Blackbird out numbers the typical form. Stuart Baker, Records of the Indian Museum, Report on Birds of the Abor Expedition, Vol. viii, p. 278, *et. seq.*, gives his reasons for not following Dr. Hartert in his treatment of this Blackbird as a geographical form of *T. ruficollis*, but considers it a good species, probably the most correct conclusion, unless interbreeding takes place more frequently than is generally known.

189. *Turdus protomomelas* Cabanis [679].—The Black-busted Ouzel.
Merula protomomelæna, Oates, F. B. I., Vol. ii, p. 133.

Margherita, 27-12-02, ♂; Derpai, 2-2-05, ♂. Observed at Guijan on R. Dibru in scrub jungle in cold weather.

190. *Turdus obscurus* Gmel. [680].—The Dark Ouzel.
Merula obscurus, Oates, F. B. I., Vol. ii., p. 134.

Dejoo, North Lakhimpur (base of hills), 18-2-05, ♀, single record. All these Ouzels are cold season migrants, which occur at times in parties up to a dozen or thereabouts, but more frequently odd birds; they are generally difficult of approach and very shy.

191. *Geocichla citrinus* (Lath.) [686].—The Orange-headed Ground-Thrush.
Dejoo, North Lakhimpur, December, April.

My information is very meagre as regards this Ground-Thrush's status, probably resident as a resting species at the foot of the hills. Failed to meet with it in the plains.

192. *Monticola erythrogaster* (Vig.) [690].—The Chestnut-bellied Rock-Thrush.
Petrophila erythrogaster, Oates, F. B. I., Vol. ii., p. 143.

Dejoo, North Lakhimpur (base of hills), 18-2-05, ♀, single record.

193. *Monticola solitarius solitarius* (L.) [692].—The Eastern Blue Rock-Thrush.
Petrophila solitarius, Oates, F. B. I., Vol. ii., p. 145.

Dejoo, North Lakhimpur (base of hills), 4-12-10*.

194. *Monticola solitarius cyanus* (L.) [693].—The Western Blue Rock-Thrush.
Petrophila cyanus, Oates, F. B. I., Vol. ii., p. 146.

Descends to the foot of the hills in North Lakhimpur at the cold season. A shy bird in its native haunts, extremely wary in the wild gorges of these hills, and yet a few miles nearer the plains appears quite at home in the vicinity of dwellings. A corrugated iron roof of any building seems to have a peculiar attraction. Also seen at times darting about bungalow verandahs in quest of insects. An almost complete reversion of its accustomed wild nature. One was brought in to me by a youth which had been knocked over with a stone.

Dejoo, 18-9-08,* 25-9-05,* 4-10-07,* 10-11-08 *; Runganuddie Gorge. 14-11-05, ♂; Silonibari, 19-10-11; Dejoo River, 18-12-10, two noted; Dejoo. 29-12-04, ♀; Subansiri Gorge, 27-1-05, ♀; Dejoo, 15-3-09*; Silonibari, 15-4-11*.

Iris brown; bill and tarsus horny black.

195. *Turdus dauma dauma*, Latham. [698].—The Small-billed Mountain-Thrush.
Oreocincla dauma, Oates, F. B. I., Vol. ii., p. 152

Occurs sparingly in the plains during the cold season.

Rungagora, 8-1-04, ♂; Panitola, Dinjan, Lilabari 21-3-05, ♂ ♂.

196. *Zoothera marginata*, Blyth. [705].—The Large Brown Thrush.

Occurs in the plains during the cold season, partial to dense reed jungle along the banks of sluggish streams in evergreen forest.

Margherita, January; Gurrung, January; Rungagora, January.

197. *Cinclus pallasii tenuirostris*, Bp. [709].—The Brown-Dipper.
Cinclus asiaticus, Oates, F. B. I., Vol. ii., p. 163.

Confined to the hill rivers on the north frontier, probably extending around the head of the valley. In the cold season the limits of the fast flowing water apparently restricts their range. The "gagris" or rapids in

the wild gorges are their favourite haunts. One of the wariest birds, its arrowy flight as it skims a foot or so above the water and the inaccessible nature of its haunts make it a most difficult task to procure specimens. The following records have been noted: Panchnoi, November 1905*; R. Dejoo, higher reaches, 11-12-04*; Runganuddie Gorge, 12-11-05, ♀, 3-3-07, ♂ juv., 8 to 14-11-05,* half a dozen or so pairs; R. Dejoo, 9-4-07, left branch higher reaches, probably a pair and young; Subansiri Gorge, Sifoo Mukh, 26-2-06 ♂, juv. Lost two adult birds which were swept down the river, now in spate all efforts to secure them were to no purpose, although one hill-man was up to his chest in the seething water. Subansiri Gorge, second defile between Ganditola and Sifoo Mukh, 29-1-06. Two nests each containing five eggs placed in niches in the rock a few feet above the water, only accessible by boat; a third, too high up on the precipitous face of the rocks on the left bank to reach. In all cases the birds left the nests on our approach disclosing their situation. This river very often rises many feet in the cold weather and, in any case, its waters are augmented before such rivers as the Runganuddie and Dikrang. Late nesting birds would have only a remote chance of bringing up their broods.

198. *Ploceus baya megarhynchus*, Hume. [721]. The Baya.
Ploceus megarhynchus (part.), Oates, F. B. I., Vol. ii., p. 176.

The distribution of the weaver birds are only imperfectly known undoubtedly locally migratory, appear to leave the foot of the hills in North Lakhimpur about the middle of August, the following data record the sum total of my observations—Rungagora, 11-4-12*, 28-6-03, ♂, Chota Jingrai, 15 and 16-2-04, ♂ ♀; Dejoo, 5-4-10*, 28-5-04, ♂ ♀. No records available for *P. bengalensis*, possibly overlooked.

199. *Ploceus manyar flaviceps*, Less. [723].—The Striated Weaver-Bird.
Ploceus manyar, Oates, F. B. I., Vol. ii., p. 179.

Records for Rungagora, 10/14-4-03; Dejoo and North Lakhimpur, June and July.

200. *Munia atricapilla* (Vieill.) [726].—The Chestnut-bellied Munia.

Records as follows:—Dejoo, April, May, June, July; Rungagora and Maijan, April.

201. *Munia acuticauda*, Hodgs. [727].—Hodgson's Munia.
Uroloncha acuticauda, Oates, F. B. I., p. 184.

Numerous records: Rungagora, March, May; Margherita, Dejoo, June July, August; Beni, Abor-Miri hills, February.

202. *Munia punctulata punctulata* (L.) [735].—The Spotted Munia.
Uroloncha punctulata, Oates, F. B. I., Vol. ii., p. 189.

Margherita, March; Rungagora, August, October.

203. *Amandava amandava* (L.) [738].—The Indian Red Munia.
Sporæginthus amandava, Oates, F.B.I., Vol. ii., p. 192.

Particularly plentiful on the vast expanses of "chopra" grass lands adjacent to the main rivers. Komolabari (Bramapootra), September, a large series collected; Hessamara (Subansiri), December, January; Panitola, Dinjan, June, December. Occasionally arrives at the foot of the hills in North Lakhimpur; Dejoo, 8-12-08. I noted a male twittering whilst in flight over a "hoolah" under "dhan" cultivation in the garden; the first occasion on which this bright coloured Munia has come under my observation so far distant from its accustomed haunts. Nalkatta Road, North Lakhimpur, 26-11-10*. In dhan khets possibly attracted at this time of the year to the outskirts of the forest tracts wherever cultivation is in progress, but can only be regarded as a straggler to these localities.

204. *Carpodacus erythrina roseata* (Hodgs.) [761].—The Common Rose Finch.

Carpodacus erythrinus, Oates, F. B. I., Vol. ii., p. 219.

Occurs on its return to the hills, remains for very brief intervals, its movements are very erratic, only noted twice on its descent to the plains.

Dejoo, 28-9-10*, a party of four adjacent to bungalow, their call attracted my attention; Silonibari, 26-9-11*, I heard this bird's call for two days only, first at early morning and again on the following day at 12 p.m. Dejoo, 3-05 ♂, a single bird shot out of mulberry tree near my bungalow. A party of females observed a week later. Rungagora, 30-3-03, 1-4-03, several males secured out of a party which occupied the mulberry trees, somewhat wild, left the following day. Three males have the crown and throat marked with brilliant rose color.

Dejoo, 19-4-07, ♂, several about amongst the plantains around the coolie lines.

♀ Iris brown; bill and tarsus plumbeous horny brown.

205. *Passer domesticus indicus*, Jard. and Selby. [776].—The Indian House-Sparrow.

Passer domesticus, Oates, F. B. I., Vol. ii, p. 236.

Distributed over the whole area in the vicinity of habitations. Both this species and *P. montana malaccensis* frequently occupy the eaves of the same dwelling as at Rungagora in equal numbers, whilst at Dejoo, *P. domesticus indicus*, was in the minority.

206. *Passer montana malaccensis*, Dubois. [779].

Passer montanus, Oates, F. B. I., Vol. ii., p. 240.

Similar distribution and habits as *P. domesticus indicus*.

207. *Passer rutilans cinnamomea* (Gould.) [780].—The Cinnamon Tree-Sparrow.

Passer cinnamomeus, Oates, F. B. I., Vol. ii., p. 240.

A hill sparrow, descends to the plains in North Lakhimpur during the cold season for a considerable distance as far as Boduti on the Subansiri (Nov. 1906) at all events. First seen at Hessamara in large parties occupying the naked branches of some high trees in "pothar" land, specimens procured 18-1-05.

Occurs around Beni, Abor-Miri hills, February 1906. Dejoo, 7-10-07, a party of six or thereabouts in the long grass in the Rajghur, essentially a grass sparrow; Boduti, 11-11-07*, in heavy grass land some few miles from Boduti; Bipuria basti, Boduti, 17-11-10*, in considerable numbers in the grass lands.

208. *Emberiza fucata arcuata*, Sharpe. [790].—The Himalayan Grey-headed Bunting.

Emberiza fucata, Oates, F. B. I., Vol. ii., p. 252.

Dejoo; North Lakhimpur, 25-4-04, ♂, ♀*.

This date constitutes the only record. A pair located on an open space of ground, probably on their return to the hills; heavy rain night previous.

209. *Emberiza pusilla*, Pallas. [791].—The Little Bunting.

A regular cold season migrant to the foot of the hills in North Lakhimpur first attracted my notice 25-1-08. Very liable to be overlooked or confounded with a pipit owing to its sombre colours and similar habits. Its sharp note more often is a means of identification.

Silonibari, 19-10-11*, a single bird; Dejoo, 11-11-10, ♂, ♀,* in the garden amongst the tea bushes. Noted again 9-12-10, and a pair seen 26-12-10, which had been about for some time. Dejoo, 15-1-09, several of these Buntings in the pruned tea in Rajghur first day after rain. The year previous they were found in much the same quarter although they had a preference for the unpruned bushes.

The following records from Dejoo, 9-11-09,* a pair in some scrub growth along road-side, very familiar and loathe to move, a dull day, 16-3-10*, a small party of five near coolie lines; 22-3-10*, a pair, heavy rain the day and night previously; 24-3-10*, similar locality to previous record, eight or thereabouts which disappeared next day; Dhoolohat, 21-3-09, * amongst tea bushes; Silonibari, 19-4-11, * a party of several individuals, four counted.

210. *Emberiza aureola*, Pallas. [797].—The Yellow-Breasted Bunting.
Dejoo, North Lakhimpur, 7-10-08, ♂, single record.

211. *Emberiza spodocephala melanops*, Blyth. [798].
Emberiza spodocephala, Oates, F. B. I., Vol. i., p. 260.
Generally distributed throughout the cold season, the common bunting of the plainss, eldom observed at the foot of the hills in North Lakhimpur; frequents patches of open ground in grass lands precincts of scrub growth and cultivated tracts. Rungagora, December, January, February, April, 14-4-03, ♀; Joyhing, 4-12-10*, Dhunsirimukh, 24-3-09, ♂, ♀;* Tejoo, 22-3-10, a party of eight to ten on waste ground near river-side, heavy rain last two days, specimens procured on 26 and 27-3-10. Bipuria, 10-4-11*, in grass land.

212. *Hirundo urbica cashmeriensis* (Gould) [805].—The Kashmir Martin.
Chelidon kashmiriensis, Oates, F. B. I., Vol. ii., p. 269.
Derpai, North Lakhimpur (entrance Subansiri Gorge), 30-1-05, ♀.
Single specimen only procured. Others noted at same time no doubt were this Martin.

213. *Hirundo nepalensis* (Moore) [807].—Hodgson's Martin.
Chelidon nepalensis, Oates, F. B. I., Vol. ii., p. 271.
Recorded first from Pobha Mukh., Subansiri, Gorge, 24-1-05.
Several secured at the time in the evening, dirty weather.
Iris brown; bill pale horny black; tarsus white.

214. *Riparia paludicola chinensis* (Gray) [809].—The Indian Sand Martin.
Cotile sinensis, Oates, F. B. I., Vol. ii., p. 273.
Distributed throughout the plains along the sandy banks of the rivers.
Failed to meet with *R. r. riparia* probably overlooked.
Dr. Hartert treats all the Asiatic forms within Palæarctic limits as subspecies of *R. r. riparia*, but considers this Sand Martin is probably a subspecies of *R. paludicola* (Vieill.)

215. *Chelidon rustica gutturalis* (Scop.) [813].—The Eastern Swallow.
Hirundo gutturalis, Oates, F. B. I., Vol. ii., p. 277.
Records as follows: Rungagora, November, January; Dejoo, 5-10-10*, 21-10-04, ♀, December. More information required as to its arrival and departure and status in general.

216. *Chelidon rustica tytleri* (Jerd.) [815].—Tytler's Swallow.
Hirundo tytleri, Oates, F. B. I., Vol. ii, p. 278.
Bhimpoora bhil (Gogaldhubie); North Lakhimpur, 7-1-05, ♀; 10-1-05, ♂.
Hawking for insects over the water.
Iris dark-brown; bill black; tarsus light horny purple.

217. *Chelidon daurica nipalensis* (Hodgs.) [822].—Hodgson's Striated Swallow.
Hirundo nepalensis, Oates, F. B. I., Vol. ii., p. 282.
Notes recorded and specimens secured as follows:—
Dejoo, 28-9-07*, many hawking to-day, rain previously, 29-9-08*, a pair during a rainy spell of weather, 5-10-10*, 8-10-07*, in company with some large Swifts, sp. ?; 21-10-04 ♂, North Lakhimpur ♂, 21-10-05 ♂. Silonibari, 2-5-11*, young bird.
Iris hazel-brown; bill and tarsus black.

218. *Motacilla alba alba*, L. [826].—The White Wagtail.

Rungagora, 1-9-01 *, single bird, 16-9-01*, single bird, one secured, 15-9-01, 6-9-02* ; Komolabari, 7-9-04, ♀ ; Dejoo, 19-9-08*, two adults, one immature ; Margherita, 27-3-03, ♀ ; Silonibari, 29-4-11*, two adults also observed, 22-4-11*, 4-5-11 single bird ; several in evidence, 2-5-11. Numerous specimens secured in the intervening cold season months.

219. *Motacilla alba leucopsis*, Gould. [827].—The White-faced Wagtail.

Motacilla leucopsis, Oates, F. B. I., Vol. ii., p. 288.

Dejoo, 15-9-08, ♂ ♂, in fat condition ; two others noted on 19-9-08. Komolabari, 12/25-9-04, ♂, ♂. Possibly not quite as common as the typical form ; the above records constitute the sum total of authentic data.

220. *Motacilla alba personata*, Gould. [829].—The Masked Wagtail.

Motacilla personata, Oates, F. B. I., Vol. ii., p. 290.

Silonibari, 9-9-11* ; Komolabari, 15/25-9-04, ♂. The only records.

221. *Motacilla alba hodgsoni*, Gray. [830].—Hodgson's Pied Wagtail.

Motacilla hodgsoni, Oates, F. B. I., Vol. ii., p. 291.

Dejoo, 29-9-08, several in evidence. only one procured. Specimens obtained in December, February, March.

The Pied Wagtails are difficult birds to discriminate unless seen under favourable conditions. The colour of the back and ear coverts are the most important characters to note. The above records are somewhat meagre in consequence of these contensions.

222. *Motacilla boarula melanope* Pall. [832].—The Grey Wagtail.

Motacilla melanope, Oates, F. B. I., Vol. ii., p. 293.

Cold season migrant at its first descent to the base of the foot hills in North Lakhimpur is to be seen in the vicinity of habitations when it is remarkably tame and not easily disturbed. It remains in these haunts for only a brief period and forsakes these unusual quarters for its accustomed haunts along the stony beds of the hill streams and rivers. It is then very shy and difficult of approach.

Lilabari, 5-9-08*, single bird ; Dejoo, 6-9-08*, single bird ; Silonibari 9-9-11*, single bird and at Dejoo on 17-9-07, ♀, 17-9-10*, single bird, 21-9-08, ♂, 23-9-07*, single bird, 24-4-03, ♂, 26-4-03, ♀.

223. *Motacilla flava borealis*, Sund. [833].—The Grey-headed Wagtail.

Motacilla borealis, Oates, F. B. I., Vol. ii., p. 294.

Dejoo, 27-3-10* ; Rungagora, 4-5-03.

224. *Motacilla flava flava*, L. [834].—The Blue-headed Wagtail.

Komolabari, 15/25-9-04, ♂ ; Silonibari, 22-4-11, several, first very hot day succeeding the rain which had fallen lately will disperse them ; Dejoo, 30-4-10*, several adult birds.

Frequently seen in some numbers amongst the tea bushes foraging on the newly hold ground, adults seldom met with. Its occurrence seems somewhat irregular.

225. *Motacilla citreola citreola*, Pall. [837].—The Yellow-headed Wagtail.

Dejoo, 4-3-09*, three immature birds in low land and 13/15-3-03* several in evidence.

Rungagora, 13-4-03, ♀ ; 15-4-03, ♂ ; Silonibari, 24-4-11* single bird ; seen 20-4-11*, a single ; Rungagora, 4-5-03, ♀.

Dejoo, 27-5-07*, single bird in forest clearance, rather wild, extremely late date and 22-8-10*, a pair of immature birds, never seen again, very hot weather shortly afterwards, a most unusual early date.

226. *Motacilla citreola citreoloides* (Gould.) [838].—Hodgson's Yellow-headed Wagtail.

Motacilla citreoloides, Oates, F. B. I., Vol. ii., p. 299.

Rungagora, 8-4-03, ♂, 7-4-03, ♂, immature; 4-5-03, ♀. Both these two species are most commonly noted in the plains than under the foot hills in North Lakhimpur and are moreover in evidence at the latter localities more frequently on their return migration, very aquatic, immature birds are separated with difficulty from the typical form.

227. *Anthus trivialis maculatus*, Jerd. [841].—The Indian Tree Pipit.

Anthus maculatus, Oates, F. B. I., Vol. ii., p. 304.

Occurs in the plains at the cold season.

Dejoo, 3-10-10*, an influx about this time, single bird first noted 30-9-10 and 26-9-08*. In clearance, forest at base of hills.

Specimens procured at Dejoo, January; Derpai, March; Rungagora, April; 8-4-03, ♀; Beni, Abor-Miri hills, February; Margherita, February, March.

228. *Anthus richardi richardi*, Vieill. [845].—Richard's Pipit.

Dejoo, North Lakhimpur, 27-1-08, ♂, ♂.

229. *Anthus richardi striolatus*, Blyth. [846].—Blyth's Pipit.

Anthus striolatus, Oates, F. B. I., Vol. ii., p. 308.

Dejoo, 26-9-08*, 28-9-10*, single bird, 25-12-10; Dejoo, 6-4-08, large parties in a patch of cleared ground possibly some *A. r. rufulus*; Komolabari, 1-5-03, ♀; Dejoo, 20-7-10*, first occasion noted since last cold season.

230. *Anthus richardi rufulus*, Vieill. [847].—The Indian Pipit.

Anthus rufulus, Oates, F. B. I., Vol. ii., p. 308.

Dejoo, December, March, May, July, August, specimens secured these months; Silonibari, July; Rungagora, May.

Iris brown; bill horny black excepting upper mandible and tip of lower mandible pale dull yellow; claws horny.

231. *Anthus roseatus*, Blyth. [850].—Hodgson's Pipit.

Anthus rosaceus, Oates, F. B. I., Vol. ii., p. 311.

Plentiful around Rungagora. One secured 4-5-03 ♀, occurs also Margherita; very aquatic.

232. *Alauda gulgula gulgula*, Frankl., [861].—The Indian Sky-Lark.

Dhunsirimukh, south bank. Bramapootra, 15-2-11, ♂. *Alauda arvensis* is recorded for Assam. My data is insufficient to give the distribution of these two species with certainty. It is no uncommon occurrence to hear Sky-Larks gaily singing in some numbers along the vast sandy grass churs of the Bramapootra. Noted particularly at Komolabari in February 1907.

233. *Alauda raytal raytal* (Buch. Ham.) [866].—The Ganges Sand-Lark.

Procured on the Subansiri at Hessamara, 9-4-05 ♂, and occurs on all the large rivers in the plains, at times in parties of a dozen or thereabouts.

234. *Mirafra assamica*, Mc. Clell. [870].—The Bengal Bush-Lark.

Resident: Breading during May and June in North Lakhimpur, although seldom found even in land that is constantly undergoing cultivation. Dejoo, nest containing four fully fledged young, 18-4-08, situated on ground underneath a clod of earth. Specimens secured at Dejoo, March, May, August, juvenis; Dhunsirimukh, February; Rungagora, January, August.

235. *Æthopyga seheriæ seheriæ* (Tickell.) [882].—The Himalayan Yellow-backed Sun-bird.

Resident: The common Sun-bird in the plains. At the commencement of the breeding season (March) large parties of males at times may be seen disporting together with gay twitterings and engaged in pugnacious bouts

from the confines of a favourite tree. Dejoo, 9-5-07. Nest containing two eggs situated behind the stumps of a fallen tree in a forest "putti" or newly cut track. Judging by the large series of dated skins in my collection the young male has the throat tinged with rose colour in June and sometimes towards the end of February has not fully assumed the adult plumage.

236. *Æthopyga ignicaudus* (Hodgs.) [887].—The Fire-tailed Yellow-backed Sun-bird.

A hill species, observed at Dejoo, foot of the hills, North Lakhimpur, on the following occasions:—25-3-07*, adult ♂, 28-1-09*; an immature ♂ in company with White-eyes (*Zosterops pæpebrosa*) and Spider-hunters (*Arachothera magna*) searching the flowers on the tea bushes. These records I regard as of unusual interest as no mistake was made in my identification although no specimens were secured.

237. *Æthopyga saturatus* (Hodgs.) [890].—The Black-breasted Yellow-backed Sun-bird.

Resident throughout the plains, more addicted to forest than *A. seheriæ*. Although strangely enough I secured several females out of a large party of this sex, about twelve or so, in the grass lands at Hessamara in December; forest Dibru to Bramapootra, 21-3-02. A pair of Sun-birds with crest of a decided yellow evidently due to the birds poking their bills into the flowers and the pollen sticking to the damp feathers; for the moment I took them for something out of the common.

238. *Arachnethera magna* (Hodgs.) [906].—The Larger Streaked Spider-hunter.

Throughout the plains, very partial to plantain clumps, particularly plentiful at the foot of the hills in North Lakhimpur. Margherita, November, January, February; Rungagora, December, January; Guijan, March: Panitola, Derpai, January; Dejoo, December, May, July.

239. *Arachnethera longirostra* (Lath.) [909].—The Little Spider-hunter.

Apparently confined to the north-east corner, occurs around Margherita. A pair seen near Bozaltoli on the Rungagora-Tinsukia road, 17-7-02; the farthest limit in the plains and the only occasion that has come under my observation.

240. *Chalcoparia phœnicotis* (Temm.) [911].—The Ruby-cheek.

Decidedly rare. Locally distributed throughout the district. A ♂ secured in April 1903, dense evergreen forest, right bank, Runganuddie; ♂, ♀, 7-2-04 obtained from a party of several individual forest below Rungagora on the right bank of R. Dibru.

241. *Dicæum cruentata cruentata* (L.) [912].—The Scarlet-backed Flower-pecker.

Resident throughout the plains. Rungagora, Maijan, April, May, June; Dejoo, July, August, September, October.

242. *Dicæum iqnipectus* (Hodgs.) [915].—The Fire-breasted Flower-pecker.

Procured in the Abor Miri-hills, north frontier. Beni-chang, 8-2-06, ♂.

243. *Dicæum minullum olivaceum*, Wald. [917].—The Plain-coloured Flower pecker.

Dicæum olivaccum Oates. F. B. T., Vol. II., p. 380.

Apparently resident at Dejoo, base of hills, North Lakhimpur. Four specimens procured, 6-6-04, 22-6-04, 3-7-04, 22-7-04, probably overlooked owing to its insignificant size and dull plumage.

(*To be continued.*)

THE PALMS OF BRITISH INDIA AND CEYLON, INDIGENOUS AND INTRODUCED

BY

E. Blatter, S.J.

Part XI.

(With Plates LXIV—LXVIII.)

(Continued from page 682 of Volume XXII.)

HOWEA, Becc.

(After Lord Howe's Island; Lord Howe lived from 1725-1799).

Howea Becc. Malesia (Howeia) I (1877), 66; Webbia IV (1713), 156.—Benth & Hook. Gen. Plant. III, 904.—*Grisebachia* H. Wendl. & Drude in Linnæa, XXXIX (1875), 88,200, t. IV, f. 1-2.—*Kentia* Benth. Fl. Austral. VII, 137.

Stem arborescent, erect, annulate. Leaves terminal, regularly pinnate, slender-petioled, bright green, with a sheath completely embracing the stem in their lowest part. Segments numerous, straight, not sigmoidal, 3-sub-5-costulate, acuminate, the upper ones gradually decrescent, the terminal ones free to the base.

Spadix much elongate, inserted at the nodes of fallen leaves, rising solitary or 3-6 from one and the same basilar spathe, compressed, marcescent. Floriferous part strongly alveolate or scrobiculate, first completely enclosed in its proper spathe which opens longitudinally. Flowers ternate in the scrobiculi up to the end of the spadix; the two lateral flowers are male and one of them provided with a special bract; the female flowers develop long after the male flowers have fallen. Male flowers: regular; sepals coriaceous, acutely carinate on the back; petals coriaceous; stamens numerous (30-100); anthers linear, basifixed; pistillode O or inconspicuous. Female flowers: sepals rotundate, cucullate, coriaceous; corolla slightly longer than the calyx; petals broadly imbricate below, ending in a stout point; staminodes 6, small, dentiform; ovary with one small cell, placed in the lowest part, ovate-elongate, terminated by 3 trigonous, stout, connivent stigmas; ovule anatropous, erect from the base of the cell.

Fruit symmetrical, mucronate-umbonate at the apex; epicarp smooth; mesocarp with few fibres; endocarp very thinly woody, forming a fragile shell to the seed. Seed erect from the base of the cavity of the endocarp, ovoid, marked on both sides by 5-6 ramifications of the raphe; hilum small, basilar; albumen homogeneous, horny; embryo basilar.

SPECIES: 2*.

DISTRIBUTION:—Lord Howe's Island.

CULTIVATION IN EUROPE.—The species of *Howea* are ornamental stove palms. They do well in a compost of loam and peat, in equal proportions, to which may be added a little silver sand. They require plenty of pot room, and plenty of water throughout the summer, both at the roots and overhead. Propagation is effected by seeds, which quickly germinate in a light sandy soil, if placed on a hotbed.

When attacked by red spider or thrips, the plants must be sponged with soapy water.

Leaves 10 feet long and more .....*H. Forsteriana.*
Leaves about 7 feet long .....*H. Belmoreana.*

HOWEA FORSTERIANA, Becc. Malesia, I (1877), 66; Webbia IV (1913), 159.—Gard. Chron. Dec. 12th, 1885, 748, and March 17th, 1888, 332.—Hemsley, Fl. Lord Howe Island in Ann. of Bot. X (1896), 255.—Riccobono in Boll. Orto Bot. Palermo, fasc. 3-4 (Dic. 1906), 120 (*H. forsteriana*)—*Grisebachia forsteriana*, H. Wendl. & Drude in Linnæa, XXXIX (1875), 203, t. IV, f. 2. Kerch. Les Palm. 325, t. VII.—*Kentia forsteriana*, Moore and Mueller in Mueller, Fragm. Phyt. Austr. VII (1870), 100.—Mueller, Sec. Syst. census Austr. Pl. 201.—Maiden in Proc. Linn. Soc. N. S. Wales ex Gard. Chron. Dec. 24th (1899), 449.—*Kentia belmoriana* (partim?) Andrè in Revue Hort. (1896), 76.—*Kentia belmoriana* (partim?) Mueller, Fragm. Phyt. Austr. VIII, 234.—*Howea belmoriana* (non Becc.) Bot. Mag. t. 7018.—*Kentia australis*, Hort. ex Gard. Chron. (1873), 6 and Dec. 12th (1885), 748.

NAMES.—English: Thatch Palm; Flat-leaved Palm (according to Mueller).

German: Forster's Lord Howe Palme.

DESCRIPTION.—Stem smooth, annulate, rising to the height of about 60 feet, with a diameter of $1\frac{1}{3}$-2 feet. Leaves (of cultivated specimens) 10-12 feet long; sheath green, yellowish on the median line, elongate, much broadened below; but only for a short distance, and there completely embracing the stem. Petiole stout, about 5 feet long, broad near the base, margins very acute, regularly convex on the lower side, flattened or very slightly concave on the upper; rhachis flat above in its lower part, with a groove on each side where the segments are inserted, the flat upper portion becomes gradually narrower and ends in a very acute angle, the lower side rounded in its lower part, becoming almost flat in its upper part.

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*It has been doubtful for a long time whether the two palms described below formed one species or two. Beccari has settled the question in his paper: Contributualla conoscenza delle palme, in Webbia Vol. IV (1913) p. 156-168. It is from this paper that we have drawn our descriptions.

Segments very numerous, straight (not falcate), ensiform, slightly attenuate towards the base, where they are attached to the rhachis by a rather broad base and have the margins slightly revolute ending in a very acute point which sometimes is more or less distinctly bifid, more or less distinctly 3-5 costulate, with the median rib rather strong and acute and the lateral ones delicate; the lower surface rather densely covered with minute brown scales which give it the appearance of being finely punctate; the larger segments (the median ones) about 3 feet long and $1\frac{1}{5}$-$1\frac{3}{5}$ inch broad; the lowest ones are a little straighter, but about as long as the median ones; towards the apex the segments become smaller, *i.e.*, shorter and straighter; the two terminal ones are not united at the base, more or less one foot long and 1/3-3/5 inch broad. Spadices infrafoliar; generally several equal spadices arise collaterally above the scars of the fallen leaves, all springing forth from a common membranaceous marcescent spathe; every spadix about 2 1/2 feet long; peduncular part 2/3-1 foot long, subterete or slightly compressed, bearing towards the middle or upper third its own spathe; the axile floriferous part $1\frac{1}{3}$-$1\frac{2}{3}$ feet long, about as thick as a little finger, terete, gradually becoming thinner towards the apex, deeply and very regularly scrobiculate along 6-7 longitudinal series; scrobiculi very deep. Flowers all ternate. In every scrobiculus one of the male flowers is provided (alternately, now on one side and then on the other) with one coriaceous, triangular, acuminate bracteole; the other flower is generally without a special bracteole; in the same scrobiculus there are two imbricate suborbicular concave ciliolate bracts surrounding the female flower. The spathe special to each spadix is thickly cartaceous, covered with a thin soft greyish indument, and ending in a rigid, 4/5-1 3/5 inch long point; it opens longitudinally at the moment when the male flowers begin to open.—Male flowers: symmetrical, 2/5 inch long; the well developed bud ovate-oblong; calyx on the whole acutely trigonous, about 1/4 inch broad; sepals imbricate, coriaceous, concave-cucullate, obtuse, acutely carinate on the back, very densely barbate-ciliate on the margins; petals coriaceous, valvate; stamens very numerous (80-100); anthers linear or linear-lanceolate, much deformed and unequal on account of the mutual pressure, basifixed; filaments very unequal, those of the outer stamens short, those of the innermost even longer than the anthers and slender; pistillode inconspicuous.—Female flowers globose in the beginning, then ovate with a short conical obtuse point, a little smaller than the male flowers; sepals suborbicular, concave-cucullate, ciliolate-barbate on the margins, rotundate on the back; petals subcordate, broadly imbricate below, with a short point, stout, valvate, smooth outside; staminodes 6, unequal, dentiform, short, often confluent; stigmas arcuate, stout.

Fruiting perianth not at all or very slightly accrescent, broadly cyathiform, about ½ inch in diameter at the mouth, attenuate below; corolla by ⅓ longer than the calyx, petals with a stout broadly triangular opaque point. Fruit 1 2/5 inch long (including the perianth), ovate-elliptical, almost equally attenuate towards the two ends, terminated by the hardened and connivent remains of the stigmas which form a conical papilla; pericarp broadly corrugate when dry, only about 1/12 inch thick, with a smooth surface finely but little distinctly lineolate-venose; mesocarp consisting of only one layer of rigid fibres, situated immediately under the epicarp, as to the rest parenchymatous, almost dry and containing a few thin fibres; endocarp very thin, brittle, smooth inside. Seed erect, ovate rotundate at the apex, or with a slightly conical point, up to 4/5 inch long and about ½ inch in diameter; ramifications of raphe very distinct; albumen bony, white-cerulescent, radiating from a central line; embryo basilar, situated in the direction of the axis, 1/6 inch long.

Habitat.—Grows abundantly in Lord Howe's Island. The palm prefers the plains or low hills, especially in the neighbourhood of the sea, where the soil is more or less coralliferous (ex Becc.).

Flowering and Fruiting Season.—In its native land the tree ripens the fruit one year after the appearance of the flowers.

Beccari tells us on the authority of Riccobono that in the Botanic Garden of Palermo the male flowers open in the first year, the female ones in the second, and that the fruit ripens in the third year.

Economic uses.—For the natives of Lord Howe's Island the seeds of *Howea Forsteriana* as well as of *Belmoreana* form an important article of export.

Cultivation in Europe.—This palm is extensively grown in European gardens. It is very ornamental, especially when young, the leaves being gracefully curved and the petioles with their sheaths showing a pleasant green.

HOWEA BELMOREANA, Becc. Malesia I (1877), 66; Webbia IV (1913), 165.—Gard. Chron. Dec. 12th, 1885, 748 and March 17th, 1888, 332.—Hemsley in Ann. of Bot. X (1896), 255.—Riccobono in Boll. Orto Bot. di Palermo, V, fasc. 3-4 Decembre (1906), 120.—*Grisebachia belmoreana*, H. Wendl. & Dr. in Linnæa XXXIX (1875) 202 t. IV, f. 1; Drude & Wendl. in Nachr. K. Gesellsch. Wiss. Goett. (1875), 58; Drude in Bot. Zeitg. (1877), 636, t. 5, f. 14, 15.—Kerch. Les Palm. 325, t. IX.—*Kentia belmoreana*, Moore and Mueller, Fragm. Phyt. Austr. VII (1870), 99; Mueller Sec. Syst. Cens, Austr. Pl. 201 (non Fragm. VIII. 234). Maiden in Proc. Linn. Soc. New S. Wales, ex Gard. Chron. Dec. 24th (1898), 449.

Names.—English: Curly Palm, Belmore's Howea.

German: Belmore's Lord Howe Palme.

Description.—Smaller than *Howea Forsteriana*, stem smooth, annulate. Leaves about 7 feet long (in cultivated specimens)

petiole more or less $1\frac{2}{3}$ foot long; rhachis strongly arcuate; segments numerous, equi-distant, smaller and narrower than in the foregoing species, tricostulate, sometimes sub-5-costulate, straight (not sigmoidal), ensiform, very acuminate, with the margins more or less thickened, slightly attenuate towards the base; the larger segments (about the middle of the leaf $2\ \frac{1}{3}$-$2\ \frac{1}{2}$ feet long and about 1 inch broad, lower surface without those small brown scales of *H. Forsteriana*.

Spadices solitary, $3\ \frac{1}{3}$-5 feet long, the florifous part measuring $2\frac{1}{3}$-$3\frac{5}{6}$ feet; the peduncular part slightly compressed with rotundate margins, delicately reddish-tomentose, $\frac{1}{6}$-$\frac{3}{5}$ inch broad. Basilar spathe membranaceous, dry, marcescent, about 1 foot long, strongly compressed, with very acute narrowly winged margins, about one inch broad. Second spathe completely surrounding the floriferous part and inserted on the peduncular part about $\frac{1}{3}$ foot below the lower flower, rigidly cartaceous, dehiscent along its whole length, terminated by a rather long point, more or less densely covered with small reddish-brown scales, as to the rest glabrous; sometimes the scales are confluent and form a very thin adherent indument. The axile floriferous part of the spadix is more or less furfuraceous-reddish and finally glabrous, as thick as a little finger, gradually attenuate towards the end and very deeply scrobiculate, on the whole having the appearance of the same part in *H. Forsteriana*, only much longer; the scrobiculi seem to be more numerous (Beccari found in the specimens studied that they are arranged in 9 longitudinal series); the bract of the male flower in each scrobiculus is broadly triangular, subcordate at the base, acute.—Male flowers: oblong, in the completely developed bud 2/5 inch long, 1/5 inch broad, rotundate above. Calyx acutely trigonous; sepals strongly cucullate, very acutely carinate, ciliate on the margins. Corolla obtusely trigonous, in perfectly developed flowers about twice as long as the calyx; petals oblong, slightly concave; stamens 35—40, almost all equal, filaments very short and only in a few inner stamens more or less elongate; anthers linear, obscurely apiculate with a large connective; cells narrow, laterally dehiscent. Female flowers globular in bud and, if we are allowed to conclude from the fruiting perianth, identical with those of *H. Forsteriana*.

Fruit similar to that of *H. Forsteriana*, but shorter, ovate-elliptic, a little more attenuate towards the apex than at the base, finely striate outside when dry, $1\frac{1}{5}$-$1\frac{2}{5}$ inch long (perianth included), $\frac{5}{12}$-$\frac{7}{12}$ inch broad, terminated by the remains of the stigmas which form a depressed-conical papilla; colour greenish black; fruiting perianth the same as in the foregoing species. Seed ovate, $\frac{2}{3}$ inch long, $\frac{11}{24}$ inch broad.

Habitat.—Lord Howe's Island, but always on the mountains and on basalt, never in the coralliferous soil of the plains (ex Beccari).

Distinguishing characters of the two species of Howea : (1).

Howea Forsteriana.	*Howea Belmoreana.*
Tall. Leaves 10 feet long and more; segments patently arcuate, the largest ones $2\frac{1}{3}$-$3\frac{1}{6}$ feet long and $1\frac{1}{5}$-$1\frac{3}{5}$ inch broad, very minutely and densely punctate-squamulose on the lower surface.	Smaller. Leaves about 7 feet long; segments in the beginning erect-arcuate on the rhachis, the largest ones $3\frac{1}{3}$-$3\frac{1}{2}$ feet long and about 1 inch broad, not punctate squamulose on the lower surface.
Spadices inserted above the scars of fallen leaves to the number of 3-6, collateral, arising from the same spathe, floriferous part of spadix $1\frac{1}{3}$-$1\frac{2}{3}$ feet long; floral alveoli disposed in 7 longitudinal series.	Spadices solitary at the nodes, very long, floriferous part measuring $2\frac{1}{3}$-$3\frac{5}{6}$ feet long; floral alveoli disposed in 9 longitudinal series.
Upper spathe softly grey-tomentose, shortly mucronate at the apex.	Upper spathe more or less covered with reddish-brown scales, often confluent, as to the rest glabrous, very long, mucronate at the apex.
Male flowers: sepals densely ciliate-tomentose on the margins; stamens 80-100; anthers very unequal and angular; filaments of the outer stamens short, of the inner ones slender and elongate.	Male flowers: sepals ciliate on the margins; stamens 30-40; anthers linear, subequal; filaments all short.
Fruit ovate-elliptical, $1\frac{2}{5}$ inch long (including the perianth). Seed ovate-rotundate at the two ends, up to $\frac{4}{5}$ inch long and about $\frac{1}{2}$ inch in diameter. Embryo $\frac{1}{6}$ inch long.	Fruit ventricose-ovate or ovate-elliptical, $1\frac{1}{5}$-$1\frac{2}{5}$ inch long (including the perianth) and $\frac{8}{12}$-$\frac{9}{12}$ inch broad. Seed ovate, rotundate at both ends, $\frac{3}{5}$ inch long and $\frac{11}{24}$ inch broad. Embryo $\frac{1}{12}$ long, (always?).

HETEROSPATSHA, Scheff, in Ann. Jard. Buitenz. I. 141, 162.

[From 'heteros', variable, and 'spathe' a spathe; alluding to the inequality of the spathes.]

Benth. and Hook. Gen., Pl. III, II, 906, 51.

Stem high, unarmed. Leaves terminal, long-petioled, regularly

(1) Taken from Beccari. This table will facilitate the identification of the two species which, for a long time, have been considered to be indentical.

Heterospatha elata, Scheff., in the Botanic Garden of Calcutta.

pinnatisect, segments numerous, lanceolate, attenuate towards base and apex, acuminate, 1-nerved, the margins thickened and recurved at the base, sheath short, fibrous, swollen at the base.

Spadix decompound, branches stout, branchlets divaricate. Spathes 2, the lower one 2-cristate, the upper one much longer. Flowers monœcious on the same spadix, spirally arranged, either ternate and then the central one is female, or binate in the upper part, both being male, obscurely bracteate and bracteolate. Male flowers asymmetrical, compressed. Sepals small, subrotund, gibbous at the base, imbricate. Petals ovate, subacute, valvate. Stamens 6; filaments filiform, connate at the base, with the apices inflexed; anthers linear, dorsifixed, bifid at both ends, versatile. Rudimentary ovary columnar, 3-gonous.—Female flowers subequal to the male ones, ovoid. Sepals reniform, broadly imbricate. Petals slightly longer, orbicular. convolute-imbricate. Staminodes 6, setiform. Ovary oblong, 1- locular; stigmas small, recurved; ovule parietal pendulous.

Fruit pisiform; stigmas excentric; pericarp grumose, not fibrous, smooth on the inner side. Seed globular, erect, free; hilum basilar; raphe elongate, branches descending from the chalaza, reticulate; albumen slightly ruminate; embryo-basilar.

SPECIES: 2.

DISTRIBUTION.—Philippines, Solomon Islands? Amboina.

HETEROSPATHA ELATA, Scheff. Ann. Jart. Buitenz. I, 162.
Metroxylon elatum, Cat. Hort. Buitenz. ex Scheffer, l. c.
? *Areca elata*, Hort. ... }
? *Dypsis elata*, Hort. ... } ex Salomon, Palmen (1887) p. 82.
? *Hyophorbe elata*, Hort. }

NAME.—Kalapa outan (Amboina); Sagiusi (Visayan language); Erhabene Wechselscheide (German).

DESCRIPTION.—Leaves 13 feet long; sheath broad at the base, but short and fibrous; potiole 5 feet long; segments about 70 on each side, the longest reaching 3 feet.

Lower spathe three times shorter than the upper one, which measures 4 feet. Spadix longer than the spathes.

Fruits globular, about 3 lines in diameter.

HABITAT.—Masbate Island (Philipines) at Mabo, Marintor River (Beccari); Amboina (Scheffer).*

*Scheffer says that the plant which he described in the "Ann. Jard. Buitenz." is growing in the Botanic Garden of Buitenzorg and is said to have come from Amboina. Beccari has seen only one specimen cultivated in the Botanic Garden of Singapore, but has never met this palm in its wild State. *Cf.* Webbia I (1905), p. 328.

2. A second species, *Heterospatha*—salomonensis. Becc. Webbia III (1910), p. 153-156, is indigenous in St. George Island (Solomon Islands).

CULTIVATION IN EUROPE.—*Heterospatha elata* is an elegant stove palm with a graceful spreading habit, and remarkable for the length of the tapering segments of its pinnate fronds.

It thrives in rich sandy loam and leaf mould, and may be propagated by imported seeds.

ILLUSTRATION: Plate LXIV shows a middle-sized specimen of *Heterospathaelata*, growing in the Sibpur Botanic Garden. The photograph was kindly supplied by Major Gage.

ROSCHERIA, H. Wendl. Illustr. Hort. (1871) t. 54.

(So called after Albrecht Roscher, traveller in southern East Africa, born in 1836 at Ottensen near Hamburg, and killed in 1860 at Hisonguny, a village not far from the Nyassa.)

Bak. Fl. Maurit. p. 386. Benth. & Hook. Gen. Pl. III, 913.—Drude, Palmae, in Nat. Pfl. II, 3 p. 69.

Erect slender palms; stem armed with spines. Leaves terminal, pinnate.

Flowers monœcious, minute, solitary or in 2-flowered clusters, one female below and slightly on one side of one male, spirally arranged on the very slender branches of a compoundly-branching spadix in the axil of a leaf with a long compressed glabrous peduncle. Spathes several, smooth, complete. Male flowers: Perianth very minute. Stamens 6, included, united into a ring. Rudimentary ovary a column as long as the stamens, capped by a triquetrous disk. Female flowers: Staminodes forming a minutely-toothed cup or O. Ovary 1-, rarely 2-3-locular; ovule parietal, pendulous.

Fruit fusiform, 1-, very rarely 2-seeded, stigma subbasilar; pericarp thin-fleshy, fibrous; endocarp crustaceous, seed obliquely ascending, globose or elliptical; hilum small, orbicular, basilar; raphe spreading from the base, its branches anastomosing on the side opposite the hilum; albumen loosely ruminate; embryo basal.

SPECIES—1.

ROSCHERIA MELANOCHÆTES, Wendl. ex Baker Fl. Maurit. 387.

Verschaffeltia melanochætes, Wendl. in Illustr. Hort. (1871) t. 54.

Dypsis gracilis, Bory ex Mart. Hist. Nat. Palm. III, 181, in nota sub *Dypsis hirtula*, et t. 161, f. 5.

Regelia melanochætes, Hort. ex Salomon Palmen (1887) 111.

NAMES.—German: Schwarzborstige Roscheria.

French: Latanier Haubaum (ex Baker).

DESCRIPTION.—Palm 15-25 feet high, with many aerial roots and a stem of 2-3 inches in diameter, with a ring of spines when young below each leaf-scar. Leaves long petioled, $4\frac{1}{2}$-7 feet long, first bifid and then unequally pinnatisect; petiole $1\frac{1}{2}$-$2\frac{1}{2}$ feet

Roscheria melanochætes, Wendl., in the Botanic Garden of Peradeniya.

long, smooth, subtriquetrous, grooved down the face with a pale band running from the top of the sheath down the back of the petiole; leaf-sheath $1\frac{1}{2}$-$2\frac{1}{2}$ feet long, with a few fine black spines rising from a compressed cushion; blade pale green, 3-5 feet long, 2-3 feet broad; pinnæ 1-$1\frac{1}{2}$ feet long, bifid at the apex, with many primary views $\frac{1}{2}$-1 inch apart, clothed on the underside with medially-attached scales.

Spadix 2-6 feet long; peduncle elongate, 1-3 feet long, slender, compressed, 1 inch thick; branches very slender, subsimple, divaricate, flattened at their insertion. Spathes several, complete, narrow, compressed, unarmed, the two lower ones persistent, the upper one deciduous. Flowers pale. Male flowers symmetrical; sepals suborbicular, obtuse, concave, imbricate; petals broadly ovate, subacute, valvate; stamens 6; filaments short, triangular, acute, united into a short tube, anthers broadly didymous, dorsifixed; rudimentary ovary obconical-clavate. Female flowers larger than the male ones, subglobose; sepals subreniform, imbricate; petals longer, orbicular, convolutivo-imbricate; staminodes obscure or 0; ovary ovoid or ellipsoidal, attenuate into a 3-fid conoid stigma.

Distribution.—Seychelles, in shaded forests above 1,000 feet in elevation, common (Kirk, Horne).

Introduced in Indian gardens.

Cultivation in Europe.—Roscheria is a slender, erect stove palm. It requires treatment similar to that recommended for *Phœnix*.

Illustration.—The specimen of *Roscheria melanochætes* figured on Plate LXV has been photographed by Mr. Macmillan in the Botanic Garden of Peradeniya.

NEPHROSPERMA, Balf. f. in Bak. Fl. Maurit. 386.

(From the Greek "nephros", kidney, and "sperma" seed; alluding to the shape of the seed.)

Benth & Hook. Gen. Pl. III, II, 907, 52.—Drude, Palmae, p. 69. Monœcious. Flowers in 3-flowered clusters, one female between and below two males, spirally disposed and slightly immersed on the branches. Spadix long-peduncled, simply branching, axillary. Peduncle compressed. Spathes 2, complete, outer spiny, 3 hairy bracts surrounding the spadix within. Male flowers: Sepals imbricate; petals valvate, thickened, thrice as long as the sepals. Stamens 40-50, included, connate at the base; outer shorter, with adnate erect anthers; inner with horizontal anthers. Pistillode undivided. Female flowers: Sepals and petals imbricate. Staminodes forming a cup with many short, toothed lobes.

Fruit globular, slightly flattened on one side; stigma subapical on the flattened side; mesocarp fibrous; endocarp thin crusta-

ceous. Seed ascending, reniform; raphe spreading from the base and anastomosing at the apex; albumen densely ruminate; embryo basal.

SPECIES, 1.—Seychelles.

NEPHROSPERMA VAN HOUTTEANA, Balf. f. in Bak. Fl. Maurit. 386.—*Oncosperma Van Houtteana*, Wendl. MSS.—*Areca nobilis*, Hort. ex Solomon, p. 110.

NAME.—German: Nierenpalme.

DESCRIPTION.—Stem 20-35 feet high, 4-6 inches in diameter. Leaves 5-7 feet long; petiole under 1 foot long, green, smooth; sheath $1\frac{1}{2}$-$2\frac{1}{2}$ feet long, woolly and sparsely spiny with thin coriaceous edges; blade unequally pinnate; leaflets 3-$3\frac{1}{2}$ feet long, glabrous; broad leaflets alternating irregularly with narrow ones, the latter with a single primary vein; veins bearing a few scales towards the base beneath; terminal leaflets confluent.

Spadix 4-8 feet long; peduncle 3-$5\frac{1}{2}$ feet; branches $2\frac{1}{2}$-$3\frac{1}{4}$ feet long, compressed at the base. Basal spathe attached to the stem.

Fruit orange-red, about $\frac{1}{2}$ inch long.

HABITAT.—Seychelles; not uncommon in open places and by the side of streams, up to 1,000 feet.

CULTIVATION IN EUROPE.—This species is a very elegant stove palm. It thrives in a compost of turfy loam, leaf mould, and sand. Care should be taken not to overpot. When grown with but limited root room, and plentifully supplied with water, the plants are very useful for decorative purposes in a young state.

ILLUSTRATION.—We have to thank Mr. Phipson for the photograph reproduced on Plate LXVI. The young palm grows in Victoria Gardens, Bombay. To the left there are the stems of two specimens of *Oreodoxa regia*, whilst to the right, part of the stem and crown and several spadices of a Fishtail-Palm (*Caryota urens*) may be seen.

VERSCHAFFELTIA, Wendl., Illustr. Hort. 12, Misc. 5.

(After Ambroise Verschaffelt, Gardener at Ghent, 1825-86.)

Baker, Fl. Maurit. 387.—Benth. & Hook. Gen. Pl. III, II, 908, 55.

Monœcious. Flowers in 3-flowered clusters, one female between and below 2 males, spirally arranged on the short branches of a doubly-branched, slightly anplexicaul, slender, drooping spadix with a glabrous compressed peduncle. Spathes 3. Perianth very minute. Staminodes forming a ring with 6 short 2-lobed teeth.

Fruit globular; scar of the stigma subbasal; mesocarp spongy; endocarp thick, woody, brittle, with vertical ridges reaching from base to apex. Seed ascending, globular, umbelicate at the base.

Young Specimen of *Nephrosperma Van Houtteana*, Wendl. Victoria Gardens, Bombay.

marked with ridges corresponding to the grooves of the endocarp ; raphe branching from the hilum and anastomosing freely over the surface ; albumen deeply ruminate ; embryo subbasal.

SPECIES.—1.

DISTRIBUTION.—Seychelles.

VERSCHAFFELTIA SPLENDIDA, Wendl. in Illustr. Hort. XII, Misc. 5 ; Baker, Fl. Maurit. & Seych. 387—*Stevensonia viridifolia*, Duncan MSS.—*Phœnicophorium viridifolium*, Hort.—*Regelia magnifica*, Rollis.—*Regelia majestica*, Hort.—*Regelia princeps*, Hort.

DESCRIPTION.—Stem 80 feet high, 6-12 inches in diameter, with many aerial roots, very spiny when young. Leaf 5-8 feet long ; petiole $\frac{1}{2}$-1 foot long, pale green, semiterete, grooved down the face, spiny ; leaf-sheath $2\frac{1}{2}$-$3\frac{1}{2}$ feet long, white granular, spiny ; blade cuneate, obovate, bright green, 4-7 feet long, 3-5 feet broad, bifid, the edges deeply incised, the primary veins prominent on both surfaces, furnished with a few medially-attached scales on the lower one, each primary nerve bordered by 2 inconspicuous veinlets.

Spadix 3-6 feet long, peduncle compressed, 3-4 feet long ; flowering branches 7-8 inches long.

Fruit $\frac{7}{8}$-1 inch in diameter.

HABITAT.—Seychelles : very common amongst rocks on all islands. —Cultivated in gardens.

CULTIVATION IN EUROPE.—This species is a noble stove palm. It grows well in a moisture-laden atmosphere and suffers if the temperature falls too low, or the air becomes dry. The mixture best adapted for it is a well-drained, fibrous peat, with pieces of charcoal and turfy loam and sand intermixed. Propagation effected by seeds.

PHŒNICOPHORIUM, Wendl. Illustr. Hort. 12, t. 433.

Dunc. Cat. Hort. Maurit. 87 (*Stevensonia*).—Baker Fl. Maurit. 388 (*Stevensonia*).—Hook. & Benth. Gen. Pl. III, II, 908, 54. (*Stevensonia*)—C. Kch. Berl. Wochenschr. 1859, 401 (*Stevensonia*).

Monœcious. Flowers in 3-flowered clusters, one female between and below 2 males, spirally arranged on the thick branches of a doubly-branched, erect, long-peduncled spadix in the axil of a leaf. Spathes 2 ; outer persistent, covered with bristles ; inner woody, deciduous. Male flowers : inner segments of perianth valvate, many times longer than the outer ones. Stamens 15-20, connate at the base, included. Pistillode a subulate grooved column. Female flowers : staminodes forming a shortly-toothed cup.

Fruit a small ovoid drupe, flattened on the side on which the subbasilar stigma is placed, furnished with a ridge on the convex side when dry ; mesocarp thin, fibrous ; endocarp crustaceous, not grooved. Seed ascending, cordate-ovoid, flattened on the side on which it is attached ; branches of the raphe spreading from the

base and anastomosing near the apex; albumen deeply ruminate; embryo basilar.

SPECIES.—1.

DISTRIBUTION.—Seychelles.

PHŒNICOPHORIUM SECHELLARUM, Wendl. Illustr. Hort. XII, 433, Misc. 5—*Stevensonia grandifolia*, Duncan, Cat. Hort. Maurit. 87 (name only); Baker, Fl. Maurit. & Seych. 388.—*Astrocaryum pictum*, C. Koch.—*A. aureo-pictum*, Versch.—*A. Borsigianum*, C. Kch. Berl. Wochenschr. 1859, 401.—*Areca sechellarum*, Hort.

NAMES.—Stevensonia (usual name in gardens), Thief Palm.
Latanier feuillé (French).
Grossblättrige Stevensonia (German).

DESCRIPTION.—Stem 40-50 feet high, very spiny when young, less so when old. Petiole 9-18 inches long, glabrous, pale green, convex below; leaf-sheath 2-3 feet long, hoary, scaly and spiny; blade cuneate-obovate, bifid, oblique at the base, deeply laciniated down the side, with incised segments; primary veins prominent, bordered with two secondary veinlets on each side, clothed with a few medially-attached brown scales beneath.

Spadix 3-6 feet long; peduncle $1\frac{1}{2}$-3 feet long, compressed at the base; branches 1-$1\frac{1}{2}$ foot long. Lower spathes 15 inches long; upper club-shaped, smooth, 2-$3\frac{1}{2}$ feet long.

Fruit orange-red, $\frac{1}{3}$-$\frac{3}{8}$ inch long. Seed $\frac{1}{4}$ inch long.

HABITAT.—Seychelles: common in all the islands.

Note: J. B. Balfour wants to retain the name "Stevensonia grandifolia" given to this plant by its discoverer (Duncan), and published by him, though without description. He says: "The name Phœnicophorium, subsequently given, and invented for the purpose of commemorating the disgraceful fact of a specimen of this palm having been stolen from Kew by a foreign employé, should surely be suppressed." The present laws of nomenclature, however, seem to be in favour of the name given by Wendland.

De Kerchove explains the origin of the name 'Phœnicophorium' in this way: "... nous devous rétablir la vérité des faits et révéler la vraie étymologie de ce palmier. M. H. Wendland l' aurait appelé *Phœnicophorium* (de φοτνιξ, dattier, et φώσιον, objet volé), par suite d'un vol commis à Kew dans les circonstances suivantes: M. Ambr. Verschaffelt avait, en 1856, introduit à Gand la plante sous le nom d'*Astrocaryum aureo-pictun*. Plus tard, M. Wendland en vit trois pieds cultivés au jardin de Kew sous le nom d'*Areca Sechellarum*. Il voulu en acheter un pour les collections de Herrenhausen. Cette demande ne put être accordée le jour même. Le lendemain, un des pieds avait disparu, et les autorités anglaises ne purent, malgré leurs enquêtes, apprendre où il etait allé. M. Wendland eut à coeur d'eclaircir ce mystère, et, à force de recherches, il finit par découvrir que la précieuse plante, volée par un employé

Young Specimen of *Stevensonia* (*Phœnicophorium sechellarum*, Wendl.), growing on Malabar Hill, Bombay.

Stevensonia (*Phœnicophorium sechellarum*, Wendl.), in the Botanic Garden of Peradeniya.

de Kew, avait été vendue, après avoir passé en diverses mains, à M Borsig, de Berlin, où M. K. Koch la vit en 1859 et la décrivit sous le nom d' *Astrocaryum Borsigianum*." De Kerchove de Denterghem. Les Palmiers. Paris, 1878, p. 124-125.

Cultivation in Europe.—A noble stove palm. A hot, moisture-laden atmosphere is necessary. If the temperature is too low, or if the air becomes dry, the palm begins to suffer. It grows well in a compost of fibrous peat, pieces of charcoal, and turfy loam and sand. Perfect drainage required. Propagation by means of imported seed.

Mythological Origin of *Stevensonia*.

With regard to this palm the natives of the Seychelles narrate that a bird of gigantic proportions took, after the creation, his flight towards the sun and as he was flying too fast he lost one of his feathers. The feather was carried about in space for a long time and, finally, fell to the ground in one of the islands. There it found fertile soil and growing roots developed into a magnificent palm. The leaves of this tree consist of one piece and grow larger towards the top, resembling thus the feather of a gigantic bird of bygone times.

Illustration.—Mr. Millard was kind enough to supply us with the photograph of a young specimen of *Stevensonia* growing in his garden on Malabar Hill. The leaf-sheaths are comparatively very long and covered with long spines. There is only one leaf in our picture which distinctly shows the bifid blade of the plant. Cf. Plate LXVII.

Plate LXVIII shows a well developed palm of the same species, taken by Mr. Macmillan in the Botanic Garden of Peradeniya. Between and behind the leaves the remains of some old spadices may be seen, whilst in the centre of the crown there is a young spadix still enclosed in its spathes.

(*To be continued.*)

BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA, BURMA, AND CEYLON.

Report No. 15

By R. C. Wroughton.

Collection ... ... No. 15.
Locality... ... ... Kumaon.
Date ... ... August—March.
Collected by ... ... Mr. C. A. Crump.
Earlier Reports .. .. No. 1, E. Khandeish, Vol. XXI, p. 392, 1912; No. 2, Vol. XXI, p. 820, 1912; No. 3, Cutch, Vol. XXI, p. 826, 1912; No. 4, Nimar, Vol. XXI, p. 844, 1912; No. 5, Dharwar, Vol. XXI, p. 1170, 1912; No. 6, Kanara, Vol. XXII, p. 29, 1913; No. 7, Central Provinces, Vol. XXII, p. 45, 1913; No. 8, Bellary, Vol. XXII, p. 58, 1913; No. 9, Mysore, Vol. XXII, p. 283, 1913; No. 10, Kathiawar, Vol. XXII, p. 464, 1913; No. 11, Coorg, Vol. XXII, p. 486, 1913; No. 12, Palanpur, Vol. XXII, p. 684, 1913; No. 13, South Ceylon, Vol. XXII, p. 700, 1913; No. 14, N. Shan States, Vol. XXII, p. 710, 1913.

The Kumaon Division contains between 5 and 6 thousand square miles and lies along the Thibet boundary, immediately west of Nepal. There is a low lying area among the foot hills where the rainfall is heavy, 80 inches. Passing over the outer range northwards this is reduced at once by half. Still further inland in the form of snow the fall increases again very greatly.

The collection here dealt with was made on a line between Philibhit (800′) and the Pindari Glacier (12,000′) to the north of Almora, that is along the whole western boundary of Nepal.

Mr. Crump has furnished the following notes on the places visited by him :—

Almora, situated about 30 miles from Naini Tal. Altitude 5,200 to 5,500 feet, is connected with the higher ridges of Simtola and Kalmatiya to the West. On the East and South the Almora Hill is bounded by the Suwal River and in the West by the Kosi. For four miles round Almora the hills are bare, but beyond that the mountains are well timbered. Average temperature of the air 60; in winter snow falls occasionally but does not lie. During the rains wild hemp, nettles, thistles, wormwood, mint, and wild balsam flourish. Micaceous schists with outcrops of granite are the prevailing rocks. The decomposition of feldspar causes the characteristic boulder looking masses on the hills. (Extract from Gazetteer.)

Phurkia is 69 miles from Almora and about 3 miles below the Pindari Glacier. Altitude 10,700 feet. There is no village or cultivation. The collection was made on steep and open ground with a deep and dark soil, clothed with long grass, balsams and stunted

bushes. Rhododendrons are abundant in large isolated patches; but heavy forest ceases a mile or so below. The Pindar River issues from the Glacier at an elevation of 12,088 feet, and passes some hundreds of feet below the Phurkia bungalow, the mountains rising almost perpendicularly from its banks, tower upwards and culminate in magnificent snowclad peaks of which Nanda Devi (25,660 feet) is the principal. At Martosi and the Pindari Glacier, some 2,000 feet higher up, vegetation is much more scanty and masses of bare rock and boulders predominate.

Khati is a small village at 7,650 feet in the Pindar Valley about 1,000 feet above the river. The country here opens out into beautiful expanses of rich grass land, dotted with patches of pine, oak and bamboo forest forming compact masses of dense cover.

Dharkuri.—A camp was made here on the Pindari side almost at the top of a pass between the Pindar and Sarju Valleys. There is no village or cultivation, the whole mountain side being clothed with the deepest forest of oak, pine and bamboo.

Lwarkhet.—A large village on the other side of the pass. Nearly the whole hill side is terraced for cultivation, rice being grown in the valley below, near the river.

Bageswar is a very large village, 27 miles north of Almora, altitude 3,143 feet, on the banks of the Sarju River. The valley broadens here and is irrigated and used for the cultivation of rice, while rape seed and millets are grown on the surrounding slopes. My collection was made at a spot some three miles above Bageswar, having an adjacent cultivation of millets and heavy pine forests on the slopes above, there is also an abundant undergrowth of white thorn and in the valley dwarf date palms flourish.

Takula is a small village on the ridge between Almora and the Sarju River, it is surrounded by heavily wooded slopes, the principal trees being pines and oak, with a thick undergrowth.

Ratighat, Naini Tal.—A small village at an elevation of 3,800 feet on the road between Almora and Naini Tal. Four large valleys converge here and the mountains being very steep and heavily wooded make Ratighat a picturesque spot. Cultivation is very scanty.

Bhowali.—About eight miles to the East of Naini Tal and occupying part of the same range. The village lies in a deep hollow and is surrounded by slopes clothed with dense forest of Chir Pine and Oak. During my short stay in November the cold was intense though the altitude is only 5,700 feet.

Sitabani.—Sitabani is situated in the foot hills about twenty miles W. or S.W. of Naini Tal and at an altitude of 1,500 feet. Large forests of Sal are interspersed with tracts of open ground covered with very tall spear-grass. The ground after sloping gently from the Himalayas is broken abruptly by a line of low hills and the depression so formed is a considerable swamp, water

including several hot springs being abundant. This is another remarkably cold spot.

Ramnagar.—Ramnagar on the R. and K. Railway is roughly 30 miles west of Naini Tal and situated in the Kosi valley at the junction of the foot hills with the plains. Below the hills cultivation is extensive, irrigation being carried on by a series of very fine permanent canals.

My collection was made in the neighbourhood of the town where the soil is very light and vegetation scant.

The narrow strip of land forming the sub-montane tract or "*Bhaba*" runs immediately along the base of the foot hills and is bounded below by the dense forests of the Terai.

The "Bhaba" belt has no surface water, being stony and remarkably porous to such an extent that all the rivers flowing from the hills disappear in subterranean channels to the Terai where they reappear on the surface.

Dela.—About 8 miles west of Ramnagar. The village situated in the "Bhaba" is a collection of grass covered huts and is occupied only during the cold weather when the Hill tribes journey down to raise crops and feed their cattle returning to the hills again before the hot weather. The soil appears to be a mixture of clay and sand, very fine and soft in the river beds or on the roads but elsewhere firm and crumbling. My collection was made mostly on the flat near cultivation and a mixed jungle which includes bamboo and quantities of fig trees.

Jherna.—A village 9 miles west of Dela in the "Bhaba". The forest in this neighbourhood is mainly Sal with an abundance of Fig and Bamboo. The "Bel" tree is also plentiful and its fruit resembling the orange is much sought after by Monkeys, Chital, Pigs, &c. A heavy undergrowth of Ber bushes and long grass forms excellent cover for animals.

Lohaghat, Almora District.—A mountain village at an elevation of 5,600 feet, 30 miles east of Almora and close to the border of Nepal. The mountains in the immediate neighbourhood are of easy gradient and attain no great altitude but a few miles to the east and running north and south lies a great barrier of snow peaks and glaciers beyond which are Tibet and Nepal.

The forests of Lohaghat contain Deodar, Chir Pines, Oaks and Rhoderdendhrous water is abundant.

The principal cultivation is Tea also Rice and Wheat.

During this month (February) the rainfall was heavy and several fall of snow were experienced.

Tanakpur.—About 36 miles south of Lohaghat situated on the Sarda River immediately below the foot hills.

Pilibhit, Rohilkhund.—The town and district of Pilibhit occupy part of a flat alluvial plain the soil of which is a mixture of clay

and sand having when dry a very soft and light appearance but becoming quite firm after a shower of rain. A variety of crops are raised, the principal appearing to be wheat while on the outskirts of the town large vegetable gardens are general.

Fine Mango groves adorn the town but the surrounding country is bare of forest.

The collection is a comparatively large one consisting of 65 species, belonging to 48 genera. It was made in a country so near and so physically similar to Nepal that we could confidently expect to find in it many forms representing names recorded by Hodgson. Nor have we been disappointed for already we have been able to identify 16 forms described by Hodgson or collected by him, *viz.*, a monkey, three bats, three shrews, two carnivors and no less than seven rodents; moreover in not a few other cases, in which we were in doubt, we can now confidently say that Hodgson's names cannot stand. The collection is further interesting in that, to a considerable extent, it deals with a Fauna largely differing from any hitherto dealt with by the survey. This Fauna is linked with the European by the presence of the vole and Himalayan field mouse, and many of the bats. The mouse hares belong to a genus characteristic of and almost limited to the Himalayas. The remainder of the forms are congeners of those which we have already obtained from Lower India and Ceylon.

Mr. Crump desires to record his indebtedness for all manner of assistance, which has enabled him to obtain such good results, received from the following gentlemen:—

Colonel A. C. Hickley, 1/3rd Q. A. O., Gurkha Rifles.
C. E. D. Peters, Esq., I.C.S., Deputy Commissioner of Almora.
T. Canning, Esq., Deputy Conservator of Forestry, Almora.
E. A. Smythies, Esq., Deputy Conservator of Forests, Naini Tal.
E. H. H. Edge, Esq., Deputy Commissioner, Naini Tal.
E. R. Stevens, Esq., Deputy Conservator of Forests, Ramnagar, and specially to Major F. Wall, I.M.S., 1/3rd Gurkha Rifles.

Miss K. V. Ryley had already mapped out and partially written this report before she fell ill and had to leave.

PITHECUS RHESUS, Audeb.

The Bengal Monkey.

(Synonymy in No. 7.)

♂ 2, ♀1, 2 skulls only, Bageswar, 3,200′; ♂2, ♀1, Ratighat, 3,700′; ♂1, Sitabani, 2,000′; ♂1, ♀1, 2 skulls, Ramnagar, 1,100′; ♂1, Dela Ramnagar, 1,500′; ♂1, Jerna Ramnagar, 1,500′.

(*See* also Reports Nos. 7 and 14.)

"Among the outer ranges this monkey is more abundant than the Saugar and during the cold weather is found in large numbers up to about 4,000 feet; above this it becomes less numerous but was observed by me as high as

6,000 feet. Monkeys are particularly plentiful in the "Bhaba" where I found them associating sometimes with Saugars. The two species separate in the evening, in fact when settling down for the night, the monkeys seem much disturbed by the intrusion of Saugars.

I came suddenly upon a number of monkeys sitting in the open, when they immediately made off, leaving a young one which though able to look after itself, remained behind screaming for help. The mother returned and after carrying her offspring to a safe distance. shook and cuffed it severely. In a large colony of Macaques at Ratighat I noticed a wide variety in the colouring of faces and callosities, ranging from dusky yellow in immature individuals to brilliant red in old males."—C. A. C.

Vernacular name.—(Hindi) Bander.

(2) PRESBYTIS SCHISTACEUS, Hodgs.

The Himalayan Langur.

1840. *Semnopithecus schistaceus*, Hodgson, J. A. S. B. IX, p. 1212.
1840. *Semnopithecus nepalensis*, Hodgson, J. A. S. B. IX, p. 1212.
1888. *Semnopithecus schistaceous*, Blanford, Mammalia, No. 13.

1 ♂, Khati, Pindar Valley, 7,650′; 1 ♀, Takula, 5,350′; 1 ♀, Ratighat, 3,700′; 1 ♂, Sitabani, 2,000′; 1 ♂ (skull only), Ramnagar, 1,100′; 1 ♀, Dela Ramnagar, 1,500′; 1 ♂, Chapawat, Almora, 5,200′.

The largest of the Indian Langurs, a very handsome Monkey, distinguished from *P. entellus* by the head being distinctly paler than the back and the hands and feet hardly darker than the limbs.

"Common in all the heavy forests up to about 9,000 feet, observed at Takula, 5,500 feet. Not found at Lohaghat in February but is a visitor later on."—C. A. C.

Vernacular name—(Hindi) Gooni.

(3) PTEROPUS GIGANTEUS, Bruenn.

The Common Flying Fox.

(Synonymy in No. 2).

4 ♂ ♂, 2 ♀ ♀, Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 2, 3, 4, 5, 7, 8, 9, 10, 12 and 13.)

"No flying-foxes observed in any of the places visited in Kumaon. About 5 miles from Philibhit there is a small colony."—C. A. C.

(4) ROUSETTUS LESCHENAULTI, Desm.

Leschenault's Fruit Bat.

(Synonymy in No. 11).

19 ♂ ♂, 19 ♀ ♀, Tanakpur, Naini Tal, 7,000′.

(*See* also Report No. 11.)

"There were several thousands of these bats in a long tunnel through which flowed a canal. The bats, driven towards me by men carrying lanterns, came on in a mass, their screeches and the beating of their wings filled the tunnel with an almost deafening noise. I had no difficulty in filling several butterfly nets with specimens both male and female, most of the latter being heavy with young."—C. A. C.

(5) CYNOPTERUS SPHINX, Vahl.

The Short-nosed Fruit Bat.

(Synonymy in Report No. 6.)

3 ♂ ♂, 3 ♀ ♀, Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 6, 9, 11, 13 and 14.)

(6) Rhinolophus rouxi, Temm.

The Rufous Horse-shoe Bat.

(Synonymy in No. 5.)

1, Dhakuri, 9,000′.

(*See* also Reports Nos. 5, 6, 9 and 13.)

(7) Rhinolophus monticola, K. And.

The Himalayan Leaf-nosed Bat.

1905. *Rhinolophus monticola*, K. Anderson, P. Z. S., part 2, 1904, p. 124.

1 ♂, Khati, 7,600′. 1 ♀, Almora, 5,300′.

(8) Rhinolophus lepidus, Blyth.

The Little Indian Horse-shoe Bat.

(Synonymy in No. 6.)

1 ♀, Ranibag, Naini Tal, 2,500′; 1 ♀, Philibhit, Rohilkhand 800′.

(*See* also Reports Nos. 6, 7 and 14.)

"The specimen taken at Ranibagh was in company with a few others and was hunting for insects over a stream. The flight was slow and only a few inches above the water."—C. A.C.

(9) Rhinolophus pearsonii, Horsf.

Pearson's Horse-shoe Bat.

1851. *Rhinolophus pearsonii*, Horsfield, Cat., p. 33.
1891. *Rhinolophus pearsonii*, Blanford, Mammalia, No. 149.

1, Lwarkhet, 6,000′.

(10) Hipposideros armiger, Hodgs.

The great Himalayan Leaf-nosed Bat.

(Synonymy in No. 14.)

7 ♂ ♂, 2 ♀ ♀, Bageswar, 3,200′.

(*See* also Report No. 14.)

"These were all shot from exactly the same place. They passed once every evening over this place, coming out very early and flying at a moderate elevation, slowly and steadily, the beat of the wings being regular as with flying foxes. When wounded they were exceedingly noisy, screaming loudly."—C. A. C.

(11) Lyroderma lyra, Geoff.

The Indian Vampire Bat.

(Synonymy in No. 1.)

7 ♂ ♂, 35 ♀ ♀, Ranibagh, Naini Tal, 2,500′.

(*See* also Reports Nos. 1, 4, 5, 6, 7, 8, 9, 12, 13 and 14.)

"A very large colony between the roof and ceiling of the Ranibagh Dak Bungalow. The colony consists almost entirely of females—a few males

were secured but appeared to be immature. All deserted after being disturbed."—C. A. C.

(12) PLECOTUS HOMOCHROUS, Hodgs.

The Long-eared Bat.

1825. *Plecotus homochrous*, Hodgson, J. A. S. B. XVI, p. 895.
1891. *Plecotus auritus*, Blanford, Mammalia, No. 171.

1 ♂, Phurkia, 10,700′.

"This specimen was taken alive. In repose the ears were folded down the sides of the back, and slightly covered by the forearms. The tragus pointed directly forward."—C. A. C.

(13) MURINA HUTTONI, Pet.

The White-bellied Tube-nosed Bat.

1872. *Harpyiocephalus huttoni*, Peters, P. Z. S., p. 711.
1888. *Harpyiocephalus leucogaster*, Blanford, Mammalia, No. 202 (*partim*).

1 ♂, Khati, 7,650′.

This is nearly a topotype of the species which was described from one of Capt. Hutton's specimens obtained in the Dehra Dun.

M. huttoni was placed by Dobson as a synonym of *M. leucogaster*, M. Edw., from W. China, but that animal is much larger, having a forearm of 41 mm. and a skull length (according to the figure) of about 20 mm. as compared with 37 mm. and 17 mm. in the present species.

It may be here noted that Milne-Edwards' figures of his two species of *Murina* have been wrongly quoted, both in the explanation to the plate, in his text, and later, by Dobson. Fig. 1 is *M. leucogaster*, and Fig. 2 is *aurata*, not the converse as stated. (K. V. R.)

(14) PIPISTRELLUS MIMUS, Wrought.

The Southern Dwarf Pipistrelle.

(Synonymy in No. 1.)

1 ♂, Sitabani, 2,000′; 6 ♂♂, 4 ♀♀, Ramnagar, 1,100′; 2 ♂♂; Dela Ramnagar, 1,500′; 4 ♂♂, 1 ♀, Jerna Ramnagar, 1,500′; 3 ♂♂, 1 ♀, Philibhit, Rohilkhand, 800′.

(*See* also all previous Reports except Nos. 4 and 14.)

(15) PIPISTRELLUS COROMANDRA, Gray.

The Coromandel Pipistrelle.

(Synonymy in No. 5.)

1 ♂, Dhakuri, 9,000′; 1, Lwarkhet, 6,000′.

(*See* also Reports Nos. 5, 9, 11, 13 and 14.)

(16) SCOTOPHILUS WROUGHTONI, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

1 ♂, Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 1, 5, 6, 7, 9, 10, 11, 12 and 14.)

(17) SCOTOPHILUS KUHLI, Leach.

The Common Yellow Bat.

(Synonymy in No. 1.)

10 ♂♂, 32 ♀♀, 5 no sex, Ramnagar, 1,100′; 6 ♂♂, 5 ♀♀, 2 in al., Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 1, 3, 5, 6, 7, 9, 12 and 14.)

"Very plentiful at Ramnagar. Here as elsewhere it is invariably found in the roofs of houses. Sexes not apart at this season."—C. A. C.

(18) MYOTIS DARJELINGENSIS, Tomes.

The Darjeeling Bat.

1855. *Vespertilio darjelingensis*, Tomes, A.M.N.H. XVI, p. 102.
1891. *Vespertilio mystacinus*, Blanford, Mammalia, No. 211 (*partim*).

1 ♂, Phurkia, 10,700′; 1 ♀, 1 in al., Deori, Almora, 5,300′.

I think there can be no doubt that this is the bat taken and named by Hodgson, described by Tomes and published by Gray. It shows the characters on which Tomes relies to distinguish it from *siligorensis*, described earlier (in the same place) by him. It is quite possible that, when a comparative examination can be made, with sufficient material, these two may be found to be only one species, in which case the latter name will stand, or even both of them may prove to be identical with the European *mystacinus*. For the present, however, I think we are on safer ground in calling it *darjelingensis*.

(19) MIXIOPTERUS FULIGINOSUS, Hodgs.

Hodgson's Long-winged Bat.

1835. *Vespertilio fuliginosa*, Hodgson, J.A.S.B. IV, p. 700.
1891. *Miniopterus schreibersi*, Blanford, Mammalia, No. 216 (*partim*).

1 ♂, Ramnagar, 1,100′.

(20) PACHYURA, sp.

The Musk Shrew.

1 ♂, 1 ♀, Bageswar, 3,200′; 1 ♀, Takula, 5,300′; 11 ♂♂, 12 ♀♀, Almora, 5,300′; 3 ♂♂, 3 ♀♀, Ratighat, Naini Tal, 3,700′; 1 ♂, Bhowali, Naini Tal, 5,700′; 10 ♂♂, 14 ♀♀, Ramnagar, 1,100′; 1 ♂, 5 ♀♀, Ranibagh, 2,500′; 3 ♂♂, 3 ♀♀, Lohaghat, Almora, 5,300′; 2 ♂♂, 3 ♀♀, Philibhit, Rohilkhand, 800′.

This perhaps represents Hodgson's *Sorex soccatus*. At any rate it is closely allied to, if not identical with, the common "Musk rat" of India.

"These shrews appear to be very common at Almora. I frequently heard their shrill squeaking note in the hedges as I passed by at night. A few were taken in houses but the majority from gardens and hedges."—C.A.C.

(21) PACHYURA MICRONYX, Blyth.

Himalayan Pigmy Shrew.

1855. *Sorex micronyx*, Blyth, J.A.S.B. XXIV, p. 33.
1888. *Crocidura hodgsoni*, Blanford, Mammalia No. 124 (*partim*).

1 ♂, Ratighat, 3,700′.

This is very probably *micronyx*, which was based on two specimens, one collected by Mr. Stewart at Landour, and the other by my grandfather Major Wroughton, in the low country of Kumaon. It may prove later to be synonymous with *hodgsoni* from Darjiling, but even then the name will stand. It would seem to be quite distinct from the animals which we have so far labelled provisionally *perrotteti*.

(22) PACHYURA HODGSONI, Jerd.

The Himalayan Pigmy Shrew.

1867. *Sorex hodgsoni*, Jerdon, Mammalia, p. 57.
1888. *Crocidura hodgsoni*, Blanford, Mammalia No. 124 (*partim*).
1 ♂, Ramnagar, 1,100′.

This is most probably *hodgsoni* with the description of which it agrees well enough so far as size and locality go. The colour does not in the least fit in, but then the description was probably based on a spirit specimen, and in any case we do not know to what extent colour has any diagnostic value in this group.

"This shrew was caught amongst the ruins of a house."—C.A.C.

(23) CROCIDURA KINGIANA, And.

King's Shrew.

1877. *Crocidura* (*Cr*) *kingiana*, Anderson, J.A.S.B. XLVI, p. 281.
1888. *Crocidura fuliginosa*, Blanford, Mammalia No. 126 (*partim*).
4 ♂♂, 2 ♀♀, Phurkia, 10,700′.

(24) SORICULUS NIGRESCENS, Gray.

The Sikhim Brown-toothed Shrew.

1842. *Corsira nigrescens*, Gray, A.M.N.H., X., p. 261.
1888. *Soriculus nigrescens*, Blanford, Mammalia No. 114.
1 ♀, Phurkia, 10,700′; 4 ♂♂, 2 ♀♀, Khati, 7,650′; 3 ♀♀, Dhakuri, 9,000′.

(25) SORICULUS CAUDATUS, Horsf.

Hodgson's Brown-toothed Shrew.

1849. *Sorex caudatus*, Hodgson, A.M.N.H., ser. 2. III, p. 203 (no description).
1851. *Sorex caudatus*, Horsf. Cat. p. 135.
1888. *Soriculus caudatus*, Blanford, Mammalia No. 115.
1 ♂, 2 ♀♀, Phurkia 10,700′; 1 ♂, Martoli; 1 ♂, Khati, 7,650′.

(26) FELIX BENGALENSIS, Kerr.

The Leopard Cat.

(Synonymy in No. 11).

1 ♂, Khati, 7,600′; 1, Benaik; 1 ♂, Bhowali, Naini Tal, 5,700′.

(*See* also Reports Nos. 11 and 14.)

"Trapped in dense jungle near a stream. Probably fairly common in the hills where there is heavy forest, though owing to its predilection for dense cover it is not often observed. I doubt whether it strays to any extent, much below the foothills and Terai."—C.A.C.

Vernacular name—(Hindi) Bandaru ♂, Biralu ♀.

(27) FELIS AFFINIS, Gray.

The Jungle Cat.

(Synonymy in No. 1.)

1 ♂, Khati, 7,600′; 1 ♂, Takula, 5,300′; 1 ♂, 1 ♀, Ramnagar, 1,100′; 1 ♂, 1 ♀, Dela Ramnagar, 1,500′; 1 ♂, 1 ♀, Jerna Ramnagar, 1,500′; 2 ♂♂, 1 ♀, Lohaghat, Almora, 5,600′.

(*See* also Reports Nos. 1, 3, 4, 5, 6, 7, 10, 11 and 12.)

This is practically a topotype of the species which was based by Gray on pecimen from Gangotri in Kumaon.

"As this is not a difficult cat to trap I should say it is rare in the higher ranges above Almora. Very common in the "Bhaba" and foothills up to 4 or 5,000 feet. Above this elevation it is seldom met with. This cat varies in size to a remarkable extent, the average weight being anything between 8 and 12 lbs. It is not at all uncommon to find imbedded in their pads, quills of porcupines, they have killed or attempted to kill ; this gives some idea of the strength they can exert. At Khati, a live kitten was brought to me which I tried to tame, it remained very savage towards strangers, but in a week or so would allow me to handle it fairly freely, and would come to me when called. It purred like a domestic cat and frequently slept on my bed, but was so destructive to my clothes that I eventually gave it away."—C.A.C.

Vernacular name—(Hindi) Bandaru ♂, Biralu ♀.

(28) VIVERRICULA MALACCENSIS, Gmel.

The Small Indian Civet.

(Synonymy in No. 3.)

2 ♂ ♂, (juv) Jerna Ramnagar, 1,500′; 1 ♀, Dela Ramnagar,15,000′.

(*See* also Reports Nos. 3, 5, 7, 10, 11 and 12.)

"I could only hear of it in the "Bhaba" where I obtained two specimens."—C.A.C.

Vernacular name—(Hindi) Malpusa.

(29) PARADOXURUS NIGER, Desm.

The Indian Toddy Cat.

(Synonymy in No. 5.)

1 ♂, 1 ♀, 1 (skin only) Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 5, 7, 8, 11, and 13.)

"I heard of a Palm Civet which was caught at Phurkia and answered to the description of this species, but it is probably rather scarce except lower down where it is plentiful at Philibhit."—C.A.C.

Vernacular name—(Hindi) Kala-Pusa.

(30) PAGUMA GRAYI, Benn.

The Himalayan Palm Civet.

1835. *Paradoxurus grayi*, Bennett, P.Z.S., p. 118.
1836. *Paradoxurus nepalensis*, Hodgson, As. Res. XIX, p. 76.
1888. *Paradoxurus grayi*, Blanford, Mammalia No. 55.

2 ♀ ♀, Naini Tal, 7,000′; 2 ♂ ♂, Dhakuri, 9,000′: 1 ♀, Lwarket, 6,000′; 1 skull only, Naini Tal.

Rather larger than the common Palm Civet or "Manuri," which it very much resembles in appearance and habits.

"Trapped in dense forest, they must be purely nocturnal, for very few of the natives recognised my specimens."—C.A.C.

(31) MUNGOS MUNGO, Gmel.

The Common Indian Mungoose.

(Synonymy in No. 1.)

1 ♀, Dhakuri, 9,000′; 1 ♂, 2 ♀ ♀, Ramnagar, 1,100′; 1 ♂, Dela Ramnagar, 1,500′; 1 ♂, Jerna Ramnagar, 1,500′; 1 ♀, Tanakpur, Naini Tal, 7,000′; 2 ♂ ♂, 2 ♀ ♀, Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 1, 2, 3, 4, 5, 7, 8, 9, 11, and 13.)

"Only observed below the foothills. Very common at Philibhit."—C.A.C.

(32) Hyaena hyaena, L.

The Striped Hyæna.

(Synonymy in No. 1.)

1 ♀, Ramnagar, 1,100′.

(*See* also Reports Nos. 1, 3, 4, and 7.)

(33) Canis indicus, Hodgs

The Common Indian Jackal.

(Synonymy in No. 3.)

1 ♂, 1 ♀. Ramnagar, 1,100′: 3 ♂ ♂, Dela Ramnagar, 1,500′; 1 ♀ Jerna Ramnagar, 1,500′; 1 ♂, Champawat, Almora, 5,300′; 4 ♂ ♂, 3 ♀ ♀, Philibhit, Rohilkhand, 800′.

(*See* also all former Reports except Nos. 2 and 8.)

"Does not appear to penetrate far into the higher ranges, it is found in the Sarju Valley and is common near Almora, and the Bhaba occurs at Lohaghat and Champarat, but generally above the foothills it becomes scarce."—C. A. C.

(34) Cuon dukhunensis, Sykes.

The Indian Wild Dog.

(Synonymy in No. 2.)

1 ♀, Ramnagar, 1,100′: 1 ♂, Lohaghat, Almora, 5,600′; 1 ♀, Philibhit, Rohilkhand, 800′.

(*See* also Reports Nos. 2, 4, 7, and 11.)

"Owing to the large rewards offered by Government for the extermination of wild dogs, their numbers have been greatly reduced in the hills, but they are still fairly plentiful in the Terai and Bhaba."—C.A.C.

Vernacular name—(Hindi) Ban-kuka.

(35) Vulpes bengalensis, Shaw.

The Indian Fox.

(Synonymy in No. 1.)

1 ♂, Dela Ramnagar, 1,500′; 1 ♂, Jerna Ramnagar, 1,500′; 1 ♂, 1 ♀, Philibhit, Rohilkhand, 800′; 2 ♂, Ramnagar, 1,100′.

"Common in the Bhaba, does not ascend the hills and as a rule avoids heavy forest."—C.A.C.

(*See* also Reports Nos. 1, 3, 5, 7, 10 and 12.)

(36) Vulpes montana, Pears.

The Hill Fox.

1836. *Canis vulpes montana*, Pearson, J.A.S.B. V., p. 313 (Jan.)
1836. *Canis himalaicus*, Ogilby, P.Z.S., p. 103. (Oct.)
1838. *Vulpes nipalensis*, Gray, Charlesworth's Mag. N. H. I., p. 578.
1881. *Vulpes alopex*, Blanford, Mammalia No. 75.

1 ♂, Bageswar, 3,200′; 3 ♂ ♂, 1 ♀, Takula, 5,300′; 1 ♂, Dhakuri, 9,000′; 1 (no skull) Lwarkhet, 6,000′: 2 ♂ ♂, 2 ♀ ♀, Lohaghat, Almora, 5,600′; 1 ♀, Champarat, Almora, 5,300′.

This animal somewhat resembles the European Fox.

"A common fox between the altitudes of 5,000 and 7,000 feet. I did not observe any in the foothills or Bhaba. This species likes heavy forest. It

is rather noisy at night and frequently barks when approaching Carrion" —C.A.C.

Vernacular name—(Hindi). Pan ♂, Panli ♀.

(37). MUSTELA KATHIAH, Hodgs.

The Yellow-bellied Weasel.

1835. *Mustela (Putorius) kathiah*, Hodgson, J.A.S.B. IV., p. 702.
1841. *Mustela auriventer*, Hodgson, J.A.S.B. X., p. 909.
1841. *Mustela cathia*, Hodgson, loc. cit.
1888. *Putorius cathia*, Blanford, Mammalia No. 85.

1 ♂, 1 ♀, Bhowali, Naini Tal 7,000′.

About the size of the Common European Weasel or 'Ermine'. It is darker though brighter coloured than that animal, and lacks the busky black tail tip; moreover the underside is yellow, often almost orange instead of white, winter coat like the Ermine.'

"I obtained two specimens from Bhowali where this Weasel appears to be well-known and from information obtained from natives it has a fairly wide range."—C.A.C.

Vernacular name—(Hindi) Musk-neula.

(38) MARTES FLAVIGULA, Bodd.

The Northern Indian Marten.

1785. *Mustela flavigula*, Boddaert, Elench. Anim. p. 88.
1792. *Mustela melina*, Kerr, An. Kingd. p. 183.
1800. *Viverra quadricolor*, Shaw, Gen. Zool., Mamm. 1.2., p. 429.
1800. *Mustela leucotis*, Bechstein, Ueb. nerf. Thiers. II. p. 375.
1834. *Mustela hardwickei*, Horsfield, Zool. Journ. IV., p. 239.
1842. *Gallidictis chrysogaster*, Ham. Smith, Jard. Nat. Lib. XV., p. 167.
1881. *Mustela flavigula*, Blanford, Mammalia No. 77.

1 ♂, Khati, 7,600′; 2 ♀ ♀, Dhakuri, 9,000′; 1 ♀, Takula, 5,300′; 1 ♂, 1 skin only, Naini Tal, 7,000′; 1 ♂, Sitabani, 2,000′; 2 ♂ ♂, 1 ♀, Lohaghat, Almora, 5,600′.

This animal in size and shape closely resembles the European "Pine Marten" from which however it is distinguishable at a glance by its black head, hind-quarters and tail.

Mr. Bonhote examined very closely this group of Martens, and the above synonymy is taken almost verbatim from his paper (A.M.N.H., VII., p. 432, 1901). He recognised no less than 6 races. The trans-himalayan one (*borealis*, Radde) is a larger paler animal. The other races are from beyond the limits of this Survey except perhaps *peninsularis*, Bonh., from the Malay Peninsula, which may occur in our Tenasserim Collections. *M. gwatkinsi* included by Blanford in his synonymy is now recognised as a distinct species, its habitat is South India.

"Common from the base of the hills to 9,000 feet alt. and probably found much higher up. It is even reported from the Plains through rare low down. Hunts usually in pairs, but 3 or 4 together are met with. It is an agile climber but ungainly in its movements when on the ground, the mode of progression then being a cumbersome gallop with the back highly arched.

At Dhakuri I found four living in a hollow tree, after two had been shot, the others forsook this haunt.

I have heard and have found how tenacious of life the Indian Marten is. On one occasion I shot one of a pair at short range, it dropped flat and

motionless and ten minutes later I found it had disappeared, leaving a large pool of blood. Two days later, I found this Marten dead more than half a mile from where it fell to my shot, though it had received a heavy charge of shot through the liver and stomach.

A native at Takula told me that these Martens frequently killed his domestic cats."—C.A.C.

Vernacular name—(Hindi) Chitrola ♂, Chitroli ♀.

(39) Aonyx cinerea, Illiger.

The Clawless Otter.

(Synonymy in No. 11.)

2, Naini Tal, 7,000′.

(*See* also Report No. 11.)

The name was twice misprinted "cinera" in the synonymy quoted above.

(40) Lutra lutra, L.

The Common Otter.

(Synonymy in No. 11.)

1 and 2 skulls, Naini Tal.

"Others are well distributed in Kumaon but much time is required to obtain specimens and the few I trapped, struggled free during the night."—C.A.C.

(41) Petaurista albiventer, Gray.

Hodgson's Flying Squirrel.

1834. *Pteromys albiventer*, Gray, Ill. Ind. Zool. II., pl. 18.
1836. *Sciuropterus magnificus*, Hodgson, J.A.S.B. V., p. 231.
1891. *Pteromys magnificus*, Blamford, Mammalia No. 229.

6 ♂♂, 2 ♀♀, Naini Tal, 7,000′.

A handsome bay flying squirrel with a large number of white hairs on the back which gives it a grizzled appearance. The face, coloured like the back, with grey cheeks, serve to distinguish it at once from *caniceps*, in which the whole head is drab grey, while *nobilis*, the third species from this region, has a well defined pale line down the back, a character not present in either of the others.

Very common in the oak forests immediately surrounding the station of Naini Tal. They must be exceedingly local for in other parts of Kumaon and searched most carefully for flying-squirrels, but did not see any and only on one occasion (at Takula) did I hear this animal.

At this season December-January they do not emerge until just before dark, but their presence may be detected by their pleasant crooning call. by the quick grating noise of their teeth upon the acorns which form an important part of their diet, and by the crashing of foliage as the squirrels alight on trees after a flight. At the end of a long glide they appear to land against the tree trunks with tremendous force and while in motion it is usual for them to utter a continuous vibrating noise similar to that made by a Knife-edge drawn sideways across a plate.

A nest in a hollow tree contained a single young one which was still blind.

Vernacular name—(Hindi) Kat-Kurria.

(42) FUNAMBULUS PENNANTI, Wrought.

The Common Five striped Squirrel.

(Synonymy in No. 1.)

1 ♂, Dhakuri, 9,000′; 6 ♂♂, 4 ♀♀, Ramnagar, 1,100′; 2 ♂♂, 1 ♀, Dela Ramnagar, 1,500′; 2 ♂♂, 2 ♀♀, Jerna Ramnagar, 1,500′; 1 ♂, 3 ♀♀, Philibhit, Rohilkhand, 800′.

"Common in the 'Bhaba' but does not ascend the hills"—C. A. C.

(*See* also Reports Nos. 1, 2, 3, 4, 5, 7, 10 and 12.)

(43) TATERA INDICA, Hardw.

The Indian Gerbil.

(Synonymy in No. 1.)

4♂♂, 4♀♀, Ramnagar, 1,100′; 1♂, Dela Ramnagar, 1,500′; 2♀♀, Philibhit, Rohilkhand, 800′.

"I saw no sign of this rat above the base of the foothills"—C. A. C.

(*See* also all previous Reports except 3 and 14.)

(44) VANDELEURIA OLERACEA MODESTA, Thos.

The Kumaon Tree Mouse.

1891. *Vandeleuria oleracea*, Blanford, Mammalia No. 270 (*partim*).
1914. *Vandeleuria oleracea modesta*, Thomas, Journ. B. N. H. S. 2 ♂♂, 6 ♀♀, Ramnagar, 1,100′; 1 ♂, Dela Ramnagar, 1,500′; 1♂, Tanakpur, Naini Tal, 70,000′.

(45) VANDELEURIA RUBIDA, Thos.

The Ruddy Field Mouse.

1891. *Vandeleuria oleracea*, Blanford, Mammalia No. 270 (*partim*).
1914. *Vandeleuria rubida*, Thomas, Journ. B. N. H. S. Vol. XXIII, p. 202. 1♀, Bageswar, 3,200′.

EPIMYS RUFESCENS, GRAY.

The Common Indian Rat.

6 ♂♂, 7 ♀♀, Ramnagar, 1,100′; 1 ♀, Dela Ramnagar, 1,500′; 4♂♂, 5♀♀, Jerna Ramnagar, 1,500′; 3♂♂, 6♀♀, Philibhit, 800′.

Variety with white underparts.

2♂♂, 1♀, Lwarkhet, 6,000′; 5♂♂, 8♀♀, Khai; 7,650′; 2♂♂, 1♀, Dhakuri, 9,000′; 2♂♂, 3♀♀, Bageswar, 3,200′; 6♂♂, 3♀♀, Takula, 5,350′; 4♂♂, 4♀♀, Almora, 5,300′; 5♂♂, 1♀, Ratighat, 3,700′; 2♂♂, 2♀♀, Naini Tal, 7,000′; 2♂♂, 3♀♀, Bhowali, 5,700′; 7♂♂, 5♀♀, Sitabani, 2,000′; 6♂♂, 11♀♀, Ramnagar, 1,100′· 2♂♂, 1♀, Ranibagh; 1♂, 3♀♀, Dela Ramnagar, 1,500′; 2♂♂, 1♀, Jerna Ramnagar, 1,500′; 18♂♂, 27♀♀, Lohaghat, 5,600′.

There are two points which cannot fail to strike any one, even cursorily, examining this fine series. Firstly, the dark bellied form alone is represented from Philibhit, a station on the railway. At Ramnagar, though this form was taken, the white bellied variety was taken in equal numbers

From thence onward, even including Naini Tal and Almora,* only the white bellied form appears in the collection. Secondly, the coloration at several, especially of the higher, stations, is extraordinarily constant for each locality, while noticeably differing from that of other stations.

Further in connection with Capt. Lloyd's paper and conclusions on the variations of "*Mus rattus*" (Records, Ind. Mus. III, pt. 1. 1909), it is most interesting to note that series of (1) the white bellied form of *rufescens*, (2) *E. vicerex* and (3) *E. nitidus* were taken at Khati, living side by side and breeding perfectly true, without hybrids, thus pointing to a full specific difference between the three forms.

When the *E. rufescens* group in the survey comes to be worked out in detail, this collection will be of the utmost value. I fear it is doubtful if the survey will be able to extend collecting to much more of the Himalayas : if any member would lay himself out to make a collection representative of some other district such as this, he would do a most excellent work.

(47) Epimys vicerex, Bonh.

The North Asian Rat.

1903. *Mus vicerex*, Bonhote, A. M. N. H. XI, ser. 7, p. 473.
1891. *Mus rattus*, Blanford, Mammalia. No. 272 (*partim*).
4♂♂, 3♀♀, Dhakuri 9,000′; 6♂♂, 6♀♀, Khati, 7,600′.

Bonhote described his *vicerex* from a specimen taken at Simla. About a year earlier, Satunin (Ann. Zool. Mus. St. Petersburg, VII, p. 588, 1902) described a form from Ferghana, Turkistan, which is evidently very closely related to, if not identical with, *vicerex*. We appear therefore to be here on the southern limit of a North Asian species.

This form is at once distinguishable from the white bellied variety of *rufescens* by its shorter, markedly bicolor tail (dark above, pale below).

(48) Epimys nitidus, Hodgs.

1845. *Mus nitidus*, Hodgson, A. M. N. H. XV, p. 268.
1891. *Mus rattus*, Blanford, Mammalia No. 272 (*partim*).
4♂♂, 5♀♀, Khati, Pindar Valley, 7,600′; 1♂, 2♀♀, Lwarkhet, 6,000′; 27♂♂, 33♀♀, Lohaghat, Almora, 5,600′; 2♂♂, 3♀♀, Ratighat, 3,700′.

Though closely related to *rufescens*, this species is recognisable by its shorter tail and pale blue grey underparts ; this colour effect is produced by the slate coloured hairs being tipped with white.

"According to the natives of Lohaghat this is a field rat which comes near and into villages during the winter. It seems to be fond of rocky situations and occasionally makes a small collection of nutshells outside its abode"—C. A. C.

(49) Epimys niviventer, Hodgs.

The White-Bellied Rat.

1836. *Mus* (*Rattus*) *niviventer*, Hodgson, J. A. S. B. V., p. 234.
1891. *Mus niviventer*, Blanford, Mammalia No. 280.
2♂♂, 7♀♀, Dhakuri, 9,000′.

This species is separated from the *rufescens* group by its bicoloured tail as well as by skull characters. *E. niviventer*, which is a grey brown colour above, has a tail only slightly exceeding the head and body in length.

*These are European cantonments and there must be a constantly recurring chance of importing dark bellied individuals from the Railway.

(50) EPIMYS FULVESCENS, Gray.

The Chestnut Rat.

1846. *Mus fulvescens*, Gray, Cat. Mamm. Nep. p. 18.
1849. *Mus caudatior*, Hodgson, A. M. N. H. III, p. 203.
1891. *Mus fulvescens*, Blanford, Mammalia No. 275.
2 ♂ ♂, 7 ♀ ♀, Dhakuri, 9,000′.

These specimens are undoubtedly Hodgson's *caudatior*, and equally certainly, are the *fulvescens* of Gray. Hodgson does not seem to have published any description, but in any case Gray's older name must stand.

This is a rather bright coloured, reddish rat, markedly smaller and slighter than the common Indian Rat; it is specially noticeable on account of its very long tail which is as much as one-third longer than the head and body.

(51) MUS BOODUGA, Gray.

The Indian Field Mouse.

(Synonymy in No. 1.)

2 ♂ ♂, 1 ♀, Bageswar, 3,200′; 4 ♂ ♂, 3 ♀ ♀, in al. 1, Almora, 5,300′; 2 ♀ ♀, Sitabani, 2,000′; 18 ♂ ♂, 12 ♀ ♀, in al. 1, Ramnagar, 1,100′; 1 ♂, Ranibagh, 2,500′; 6 ♂ ♂, 2 ♀ ♀, Dela Ramnagar, 1,500′; 2 ♂ ♂, Jerna Ramnagar, 1,500′; 5 ♂ ♂, 2 ♀ ♀, Lohaghat, 5,600′; 1 ♀, Tanakpur, 7,000′; 3 ♂ ♂, 2 ♀ ♀, Philibhit, Rohilkhand, 8,000′.

(52) MUS HOMOURUS, Hodgs.

Himalayan House Mouse.

1845. *Mus homourus*, Hodgson, A. M. N. H. XV, p. 268.
1891. *Mus musculus*, Blanford, Mammalia No. 282 (*partim*).
9 ♂ ♂, 3 ♀ ♀, Khati, 7,000′; 2 ♂ ♂, 1 ♀, Dhakuri, 9,000′; 3 ♂ ♂, 2 ♀ ♀, Almora, 5,300′; 4 ♂ ♂, 1 ♀, Ratighat; 1 ♀, Naini Tal, 7,000′; 1 ♂, 2 ♀ ♀, Bhowali, 7,000′; 1 ♀, Ramnagar, 1,100′; 9 ♂ ♂, 7 ♀ ♀, Lohaghat.

This and the following represent two of the three well marked groups of house mice in India. The hair of the under parts in *homourus* is slate coloured with white tips, giving a general pale, blue-grey effect; in this it most closely resembles the *Mus musculus* of Europe. In Afghanistan and the N. W. Frontier the house mouse is a white bellied one, best known under the name of *bactrianus*. The present is probably the "Himalayan" form.

Hodgson originally published the name as '*homoourus*' but as he shortly afterwards published it as above, I think we may strain a point and treat the first spelling as a misprint.

"A common mouse in the hills, it prefers the neighbourhood of villages but is also found in hedgerows and in forest."—C.A.C.

(53) MUS DUBIUS, Hodgs.

The Nepal House Mouse.

1845. *Mus dubius*, Hodgson, A. M. N. H. XV, p. 268.
1845. *Mus urbanus*, Hodgson, l. c., p. 269.
1891. *Mus musculus*, Blanford, Mammalia No. 282 (*partim*).
1 ♂, Ratighat; 10 ♂ ♂, 15 ♀ ♀, Ramnagar, 1,100′; 1 ♀, Jerna, Ramnagar, 1,500′; 9 ♂ ♂, 10 ♀ ♀, Philibhit, Rohilkhand, 800′.

There can, I think, be no doubt that this is the animal named *dubius* and *urbanus* by Hodgson, the type of colouration is exactly as in *M. manei*.

but the present form is much lighter throughout. Should it be found later on that the two forms cannot be separated the present name must stand for the whole lot as *manei* was not published till 1852. This species under various names seems to be the house mouse of the 'Plains.'

"Common below the hills."—C.A.C.

(54) LEGGADILLA GURKHA, Thos.

The Nepal Spiny Mouse.

1914. *Leggadilla gurkha*, Thomas, Journ. B. N. H. S. Vol. XXIII, p. 199.
1 ♂ (type), Jerna Ramnagar, 1,500′; 1 ♂, Ramnagar, 1,100′; 1 ♀, Bageswar, 3,200′.

I include the Bageswar specimen with considerable hesitation. It is very considerably darker and differs in other ways, but it is a very old individual, and I am not prepared to establish a new species for it, possibly our Sikhim Collection may throw some light on its relationships.

(55) APODEMUS SYLVATICUS GRISEUS, True.

The Kumaon Long-tailed Field Mouse.

1894. *Mus arianus griseus*, True, Proc. U. S. Nat. Mus. XVII, p. 8.
1896. *Mus arianus*, Blanford, Mammalia, No. 286 (*partim*).
20 ♂ ♂, 10 ♀ ♀, Phurkia, 10,700′; 1 ♂, Martoli.

I place this series under True's name *griseus* with some hesitation. A detailed re-examination of the *sylvaticus* group as represented in India will almost certainly result in its being awarded a name to itself. *A. sylvaticus* is the common field mouse of Europe.

"Taken on open, rocky ground clothed with long grass and balsam, very plentiful at Phurkia. I saw no sign of this mouse at lower elevations."—C. A. C.

(56) NESOKIA GRIFFITHI, Horsf.

The Mountain Mole Rat.

1851. *Nesokia griffithi*, Horsfield, Cat. Mamm. H. E. I. L. Mus., p. 145.
1891. *Nesokia hardwickei*, Blanford, Mammalia No. 294 (*partim*).
1 ♂, Jerna Ramnagar, 1,500′.

The type of *Nesokia griffithi* is said to have come from "Pushut, Afghanistan." The present specimen agrees very fairly with the description and with the type, which however was a quite young animal. Some specimens in the National Collection from Kohat and Rawal Pindi I referred to this species in my paper of some years back (Journ. B. N. H. S., Vol. XVIII, p. 740) and with some hesitation I place this specimen also under *griffithi*.

(57) GUNOMYS TARAYENSIS, Horsf.

The Tarai Mole Rat.

1855. *Mus tarayensis*, Horsfield, A. M. N. H. XVI, p. 112.
1855. *Mus plurimammis*, Horsfield, loc. cit.
1855. *Mus morungensis*, Horsfield, loc. cit.
1891. *Nesokia bengalensis*, Blanford, Mammalia No. 295 (*partim*).
4 ♂ ♂, 12 ♀ ♀, Bageswar, 3,200′; 7 ♀ ♀, Takula, 5,300′.

There is very little in their colour to distinguish these from *kok* of Madras.

The three names given above were ascribed by Horsfield to Hodgson, but as Hodgson had not published them the responsibility for them is on Horsfield. Luckily the types of all three are in the South Kensington Museum, and there can be no doubt that the three are the same animal. Whether all three are also *bengalensis*, we can only decide when we have

material from Lower Bengal to guide us. I have compared skulls of the present series with those representing *bengalensis*, in the Natural History Museum and I come to the conclusion, as I did some years ago, (Journ. B. N. H. Soc., Vol. XVIII, p. 743, 1908,) that these two species are quite distinct.

(58) GOLUNDA ELLIOTI, Gray.

The Indian Bush Rat.

(Synonymy in No. 1.)

1 ♀, Bageswar, 3,200′; 1 ♂, 1 ♀, Sitabani, 2,000′; 1 ♂, Naini Tal, 7,000′; 4 ♂ ♂, 4 ♀ ♀, Dela Ramnagar, 1,500′; 1 ♀, Jerna Ramnagar, 1,500′.

This presumably should be the *Mus myothrix* of Gray; that name was based on a mutilated flat skin contributed by Hodgson; its colouring is much brighter than anything in this series.

"Decidedly rare in Kumaon."—C.A.C.

(*See* also Reports Nos. 1, 2, 3, 4, 5, 6, 7, 10 and 11.)

(59) MICROTUS (ALTICOLA) ROYLEI, Gray.

Royle's Vole.

1842. *Arvicola roylei*, Gray, A. M. N. H. X., p. 265.
1891. *Microtus roylei*, Blanford, Mammalia No. 300.

16 ♂ ♂, 16 ♀ ♀, Phurkia, 10,700′; 1 ♂, 2 ♀ ♀, Martoli.

Gray in describing the species gave the type locality as "India (Cashmere);" his Indian localities however are very often erroneous. A good deal of collecting has been done in recent years in Kashmir, notably by Col. Ward, no specimen representing *roylei* has been found. The common vole of Kashmir is *M. montosa*, True (*imitator*, Bonhote). Miss Ryley, who had carefully compared the two species, has left a note on record here to the effect that "*M. roylei* is slightly smaller, has a shorter tail, and has different colouration." Dr. Royle, who was Superintendent of the Botanical Gardens at Saharanpur, and after whom the species was named, published a book entitled "Illustrations of the Botany and other branches of the Natural History of the Himalaya Mountains and of the Flora of Cashmere." (1839.) Though he gave his chief attention to Botany, he also made a collection of Mammals. Mr. Ogilvy, in an appendix to the above book entitled "Memoir on the Mammalogy of the Himalaya," wrote a note on the distribution of the Mammals of the Himalayas, based chiefly on this Collection. He does not mention a *Microtus* by name, but refers to an extremely short tailed rat occurring in the higher Ranges of Kumaon, which it seems to me can be no other than our present species, and Gray's type specimen most probably was from the same locality. The type was originally in spirits, and was skinned out comparatively recently, it is now in very poor condition, but measurements and skull characters correspond very fairly with our present series.

"Trapped on the same ground as *Apodemus*; both were frequently taken under the same small rock. In Kashmir I observed that *Microtus* and *Apodemus* were invariably found on the same ground."—C. A. C.

(60) HYSTRIX LEUCURA, Sykes.

The Indian Porcupine.

(Synonymy in No. 1.)

1 ♀, Jerna Ramnagar, 1,500′.
1 ♂, 2 ♀ ♀, Philibhit, Rohilkhand, 800′.

This, no doubt, is Hodgson's *nepalensis* (the name was overlooked and

should be added in the synonymy referred to above as Journ. Sc. Beng., p. 220, 1841), but I cannot see that it really differs from *leucura*. It is certainly not the Short-crested Bengal Porcupine.

"Porcupines are distributed throughout Kumaon up to an elevation of at least 8,000 feet and I found quills at Khati 7,650 feet. I failed to obtain any specimens from the hills where, from their habit of dwelling among rocks instead of burrowing as in the plains, they are more difficult to locate and cannot be dug out. On several occasions I sat up for porcupines at night, but this is not a very profitable game and needs endless patience. They are very common in the Terai where, during the hot weather they lie up for the day in long grass and are put up by elephants when beating for tiger.

At Jerna I was pushing my way through a tangle of grass which appeared to have been purposely pushed over to form a network of tunnels. In one of these I perceived the motionless form of a porcupine, not more than a yard from the muzzle of my rifle. The expanding bullet entered a little behind the shoulder carrying away much of the animal's inside but he went fully thirty yards at top speed before dropping dead.

At Pilibhit porcupines are exceedingly common near the town and are doing such immense damage to the potato and other crops that a reward of Rs. 2 per head is given for their capture".—C.A.C.

Vernacular name—(Hindi) Sowla.

(61) Lepus ruficaudatus, Geoff.

The Common Indian Hare.

1826. *Lepus ruficaudatus*, Geoff., Dict. Class. ch. hist. nat. IX, p. 381.
1840. *Lepus macrotus*, Hodgson, J. A. S. B., p. 1183.
1891. *Lepus ruficaudatus*, Blanford, Mammalia No. 320.

1 ♀, Bageswar, 3,200′; 1 ♂, Takula, 5,300′; 1 ♂, Ramnagar, 1,100; 1 ♂, 1 ♀, Dela Ramnagar, 1,500′; 1 ♂, Jerna Ramnagar, 1,500′; 2 ♂ ♂, Philibhit, Rohilkhand, 800′.

These specimens must be placed here until we have undoubted *ruficaudatus* with which to compare them. Hodgson distinctly states that he has compared hares from all parts of the Gangetic Valley and could detect no difference.

"Not known above the Valley below Lwarkhet. Only four were seen between Bageswar and Almora. I am told hares are common near Almora. Thay are plentiful in the 'Dhaba'. At Lohaghat I saw one at quite 7,500 feet elevation and saw a few 2,000 feet lower down but they were always difficult to get a shot at and I failed to obtain a specimen."—C. A. C.

(62) Ochotona roylei, Ogilvy.

The Himalayan Mouse Hare.

1839. *Lagomys roylei*, Ogiby, Royle's Ill. Botany, etc., Himalaya, p. LXIX, pl. 4.
1841. *Lagomys nepalensis*, Hodgson, J. A. S. B., X., p. 854, p. 816.
1891. *Lagomys roylei*, Blanford, Mammalia No. 327.

2 ♂ ♂, 6 ♀ ♀, Phurkia, 10,700′; 3 ♂ ♂, 8 ♀ ♀, Martoli.

These Mouse Hares are small tailless animals something like a guinea pig when seen at a distance. The present species is one of the most sober coloured of the genus, being all over reddish brown with a whitish band across the back of the neck.

"This Mouse Hare is plentiful above Phurkia, only stragglers being

found below 11,000′. It is found only among rocks and heaps of stones, making no burrows, but when necessary enlarging hollows under the rocks. Apparently only one pair of adults inhabits a fairly large area. Mouse hares are perhaps the most popular and fascinating little animals of the Western Himalayas, their timid interest in the movements of a traveller being sometimes the only cheerful incident during marches over boulder strewn wastes. When approached, a mouse hare generally seeks the shelter of his particular pile of rocks ; a position can then be taken up about 10 yards away, and in time he will reappear, peeping over the top of a rock, or sitting motionless while deciding whether the intruder is dangerous or not. Once satisfied that there is no cause for alarm, he becomes bold, racing over and round the rocks and making rapid springs from one projection to another, vanishing suddenly and popping up in unexpected places, he may now snatch a few hasty mouthfuls of grass, with intervals for scratching his back and washing his face, then in a flash he is gone."—C. A. C.

Vernacular name—(Hindi) Mitua.

(63) MUNTIACUS VAGINALIS, Bodd.

The Barking Deer.

(Synonymy in No. 2.)

1 ♀, Bageswar, 3,200′.

Vernacular name—(Hindi) Kukri.

(*See* also Reports Nos. 2, 6, 7, 11 and 14.)

(64) RUSA UNICOLOR, Bechs.

The Sambhar.

(Synonymy in No. 5.)

1 ♀, Sitabani, 2,000′.

Vernacular name—(Hindi) Jereow.

(*See* also Reports Nos. 5 and 11.)

(65) NEMORHÆDUS GORAL, Hardw.

The Grey Himalayan Goral.

1825. *Antilope goral,* Hardwicke, Trans. Linn. Soc. XIV, p. 518.
1827. *Antilope duvaucelli,* H. Smith, Griff. An. Kingd. IV, p. 279.
1907. *Urotragus bedfordi,* Lydekker, Game Animals, Ind., p. 151.
1891. *Cemas goral,* Blanford, Mammalia No. 354.

1 ♀, Ratighat, 3,700′.

The latest authority, Lydekker's ' Catalogue of the Ungulates', following Pocock, recognises two species of Goral for the Indian Himalaya, *viz.*, *goral* for the Western and *hodgsoni* for the Eastern. The present specime comes apparently from the Eastern limit of the species.

Vernacular name—(Hindi) Goer.

NOTES ON INDIAN BUTTERFLIES—(*continued*).

By

Capt. W. H. Evans, R.E.

11. **Thecla mackwoodi, n. sp.** Above dark shining brown. A small dark grey depressed oval patch of modified scales beyond the apex of the cell on the forewing. Hindwing furnished with two tails and an anal lobe; outer tail long, inner tail short, about the size of the tail in *Zephyrus*; anal lobe bright orange, outwardly edged by two fine dark lines; ground colour considerably darkened between the two tails. Outer margin of the hindwing straight between veins 6 and 3, at which point it is dentate. Below dull dark brown, not so dark as above; a straight narrow silver discal band across both wings, which from vein 2 on the hindwing runs to the dorsum in a distorted line. Two large black spots at the anal angle of the hindwing, broadly crowned with orange. On both wings internally silver lined obscure dark marginal markings, which on the forewing are enlarged to prominent detached spots in interspaces 1 and 2. Expanse 1·5 inches. Caught by Mr. F. M. Mackwood at Maymyo in April 1912.

T. mackwoodi is very different to the only true *Thecla* described so far from India, *viz.*, *sassanides*, Koll.; Col. Tytler has discovered another member of this genus at Manipur, but it is quite unlike *mackwoodi*. *T. mackwoodi* is very closely allied to *T. eximia*, Fixsen, from China, from which it differs in having the discal silver line below much more prominently marked and in that the marginal markings towards the outer angle of the forewing below are much enlarged, a character it shares with *Zephyrus letha*, Watson, *ziha*, Hew. and *Chætoprocta odata*, Hew. The female of *mackwoodi* will probably be found to differ from the male in having a broad orange patch on the disc of the forewing above, as have all the females of this group of *Thecla*.

12. **Iambrix tytleri, n. sp.** Ground colour dark brown above. Two large pale yellow hyaline spots on the disc of the forewing, *viz.*, one at the upper end of the cell, contracted at the upper edge as in *Scobura cephaloides*, DeN., the second below in space 2; the inner edges of these two spots in line, as in *Scobura cephala*, Hew.; the outer edge of the lower spot much nearer to the termen, as in *Suastus gremius*, Fab. Two or three minute yellow hyaline spots at the apex as in many *Hesperiidæ*, and an opaque yellow spot in the middle of space 1. Hindwing unmarked. Below the pattern of the hindwing recalls *Iambrix salsala*, M.; the costa and the apex of the forewing and the whole of the hindwing are bright ferruginous overlaid with darker scales; remainder of the forewing black, except the outer portion near the tornus, which is pale. Spots on the forewing as above. On the hindwing there are five small silver spots; one in the cell, one on the middle of the costa in space 7, one beyond the cell in space 5 and two below, close together, in spaces 2 and 3. Cilia of the forewing concolorous: of the hindwing a good deal paler. The female resembles the male, the ground colour being rather paler and the spots slightly larger. Expanse 30 mm.

The terminal joint of the palpi is erect, long and slender; the second submedian vein 3, arises from just before the end of the cell; thus according to Watson's key the insect falls within the genus *Iambrix*. The underside of the hindwing bears a considerable resemblance to *I. salsala*; the forewing in bearing only two large discal spots resembles *S. cephala*.

Several males and one female were obtained by Col. Tytler in the Naga Hills in September 1913. Type male in my collection; type female in Col. Tytler's.

13. **Plastingia tytleri, n. sp.** Above dark brown, unspotted; cilia at the anal angle of the hindwing elongated and orange coloured, this colour extending but slightly on to the wing; streaks of yellow hair on the middle of the inner margin of the forewing and on the hindwing along the inner margin from the base to well beyond the middle, at the base of the cell and two small streaks on the disc beyond the cell. Cilia concolorous except at the anal angle. Below the entire hindwing, the apex of the forewing broadly and the costa narrowly ochreous yellow; the remainder of the forewing black; on the disc of the hindwing there are some obscure darker patches. Expanse 30 mm.

Vein 5 of the hindwing is much bent down at the origin and the antennæ are very long; thus the insect falls in *Pirdana* or *Plastingia*, two closely allied genera. Though in appearance more like a *Pirdana*, it agrees in the shape of the wing with *Plastingia*, the outer margin being short and the hindwing produced, rather as in *latoia*, Hew. Above the insect resembles *Pirdana hyela*, Hew., but the blue colour is lacking; below, except for the spots it is like *Scobura cephala*, Hew. There is a likeness also to a small *Ismene*, but the palpi are quite different.

Described from a single specimen in Col. Tytler's collection and obtained by him at Sebong, Manipur, in March 1914.

14. **Orthopætus mackwoodi, n. sp.** Mr. Mackwood recently sent me to identify several butterflies caught by him in Burma. Amongst them was a large skipper resembling so far as I know no known species. I was not able to set it and so close examination was impossible; it agrees best with *Orthopætus lalita*, Doh, especially as regards shape and size, though quite different in appearance. It is very dark brown above with a yellow frons. There is a large hyaline white spot just before the end of the cell of the forewing and a spot on the costa above it, the latter being placed rather nearer to the base. There are no other markings and the underside is exactly similar to the upperside. It differs so from any other species that there would be no difficulty in recognising it, if caught again. It was captured at Anisakan, near Maymyo, on March 24th, 1914.

15. Occurrence of *Mandarinia regalis*, Leech, in Burma. Mr. E. V. Ellis, D. C. Forests, obtained about a dozen of this interesting species in the Northern Shan States in April 1914. The butterfly is the size of a rather large *Myclesis*, say *nicotia*, Hew.; the male is black above, shot a beautiful dark blue in certain lights; the forewing is crossed by a curved discal band of bright cyaneous blue; below the ground colour is dull black and there are the usual ocelli, with obsolete irides and bordered by silvery lines. The female differs in that the band is narrower and the hindwing is not shot with blue. In the male the dorsum of the forewing is highly convex and there is a brush, etc., on the hindwing as in most species of *Mycalesis*. *Mandarinia* differs from *Mycalesis* in that none of the veins on the forewing are swollen at the base.

M. regalis is the only known species in the genus and was described by Leech in 1889 from West and Central China, where it is said to be "local, not plentiful." Fruhstorfer in 1906 described *baronesa* as a local race from Tonkin, differing in having the band on the forewing narrower. The Shan States form agrees with *baronesa* as regards the width of the band, but in Seitz's Macrolepidoptera this race is depicted with the band continued on to the hindwing; if this latter feature is a mistake, no mention being made of it in the text, then the Indian form should stand as *baronesa*.

Mr. Ellis is to be congratulated on discovering this interesting addition to the Indian fauna.

16. **Arhopala ellisi, n. sp.** During July 1912 Mr. Ellis obtained a long

series of pale blue *Arhopala* at Maymyo, all of which I at first took to be *aberrans*, DeN.; I found, however, on closer examination that I could easily separate them into two groups. Later I had the opportunity to compare them in Calcutta with De Nicéville's types of *aberrans*; one group proved to be *aberrans*, but the other group represents a new species which I propose to call *ellisi*.

The new species is very closely allied to *aberrans*; it is slightly larger; in the male the outer black border, which in *aberrans* consists of a very narrow line, is a good deal broader, increases in width towards the apex and has the inner edge rather irregular. There is no difference in the markings below, but the ground colour except at the bases is very much paler, in fact practically white.

Several specimens of the dry season were caught by Mr. Ellis at Pakokku, at 4,000 feet in January 1914, flying in company with *aberrans*; it only differs from the dry season form in having a more washed out appearance.

17. Further changes in the list of Indian butterflies. (J. B. N. H. S. XXI 982 and XXII 761). Since No. 9 of these notes was written, Fruhstorfer has progressed with the *Nymphalidæ* in Seitz's *Macro-lepidoptera Indo-australica* and Swinhoe has completed *Lepidoptera Indica*.

The following notes are from the *Macro-lepidoptera*:—

(1) **Stictopthalma camadeva, Wd.** Fruhstorfer says that *camadevoides*, DeN., is common in the Khasi Hills. He is wrong as *nicevillei*, Rober, is the Assam race, while *camadevoides* is, as far as I know, confined to Upper Burma and is a very distinct form, which is more than can be said for *nicevillei*.

(2) **Apatura ambica, Koll.,** is confined to the Western Himalayas; *nawawa*, Db., given as the race from Sikkim and Assam; *perlawia*, Fruh. as the race from Upper Burma and the Shan States.

(3) **Apatura osteria, Wd.,** is placed in the genus *Dichorragia*; the typical form is confined to Java and the Indian race given as *harmosa*, Fruh.

(4) **Apatura parisatis, Wd.** The South Indian race is given as *aberrans*, Fruh., *ormiha*, M., being confined to Ceylon.

(5) **Sephisa chandra, M.** Fruhstorfer gives the following forms of females: The rarest form resembles the male; *alija* has broad white transcellular and pale blue median spots on the forewing and clear white spots on the hindwing; *djalia*, the commonest form, has the transcellular spots small, yellowish, the median spots dark blue and the hindwing streaked with blue on the disc; *nesia* resembles *djalia*, but the streaks on the hindwing are reduced to dots. Fruhstorfer has adopted a completely different system to that which I followed in naming the forms *alisa* and *chandrana* in my list; my names have priority.

(6) **Parhestina** is replaced by *Diagora*. *Mercellina*, M., is said to be near the Chinese *subviridis*, Leech.

(7) **Stibochiona nicea, Gray;** dry season form *luridissima*, Fruh.

(8) **Abrota ganga, M.,** *fasciata*, M., probably represents the dry season form; *confinis*, Fd., is a separate species from China.

(9) **Adolias dirtea, Fab.** The typical form is confined to the Malay Peninsula, the Burmese race is *indistincta*, Fruh., which is perhaps only the dry season form of *sikkima*, Fruh., described from Siam. An albinotic female of the race *khasiana*, Swin., is given as *delia*, Fruh., and an aberration with the spots on the hindwing fulvous instead of white, *fortunata*, Fruh.

(10) **Euthalia cibaritis, Hew.,** is placed in *Tanaecia*; a form with narrow markings is *risaya*, Fruh.

(11) **Euthalia lepidea, But.,** is confined to N. E. India, the wet season form of which is *obscurata*, Fruh. The smaller, paler race from South

India is *mayana*, Fruh. The Burmese race with darker grey borders is *atharara*, Fruh. The blue-banded *andersoni*, But., from Tenasserim, is placed as a race of *flora*, But., from the Malay Peninsula.

(12) **Euthalia cocytus, Fab.**, is confined to Siam; the Indian race is *satropaces*, Hew.

(13) **Euthalia julii, Boug.**, from the Malay Peninsula is the oldest name for what we have always called *appiades*, Men. *Appiades* is the Sikkim race of which *crescens*, Fruh., is the dry season form. *Adima*, M., is the oldest name for the Assam race and was named from a male with the blue border obsolete. *Lhasana*, Swin, shows traces of the blue border and *balarama*, M., has it fully developed; *sedeva*, M., is a female with large white spots on the forewing. The Burmese race is given as *xiphimes*, But.

(14) **Euthalia jahnu, M.** The form from the Karen Hills is intermediate to *jahnides*, Fruh, from Siam.

(15) **Euthalia kesava, M.** The nymotypical form is confined to Assam; the Sikkim race is given as *arbat*, Fruh., and the Burmese race, *discrepalota* M., of which the dry season form is *rangoonensis*, Swin.

(16) **Euthalia garuda, M.**, is given from Assam with the dry season form as *meridia*, Swin. *Aanyana*, Fruh., is the race from the N. W. Himalayas to Bombay; *suddhodana*, Fruh., from Sikkim and Bengal; *apama*, Fruh., is the Burmese race; and *meridionalis*, Fruh. *diversa*, Evans, the race from South India and Ceylon; *acontius*, Hew., the Andaman race.

(17) **Euthalia vasanta, M.** Females with the white band absent are *fulica*, Fruh.

(18) **Euthalia jama, Fd.**, is the Assam race, *jamida*, Fruh., the Sikkim one and *verena*, Fruh., the Upper Burmese form.

(19) **Euthalia eriphylae, DeN.**, is given from Burma and *delmana*, Swin., as the race from Assam.

(20) **Euthalia apicalis, Voll.**, is from Borneo and is a race of *merta*, M. from Burma.

(21) **Euthalia kanda, M.**, is confined to Borneo and the Burmese race given as *elicius*, DeN.

(22) **Euthalia anosia, M.**, is given from Assam to Burma and *saitapharnes*, Fruh., as the Sikkim race.

(23) **Euthalia binghami, DeN.**, is placed as a race of *mahadeva*, M., from Java and represents an extreme dry season form, *sobrina*, Fruh., being the wet season form; *sobri*, But., which has heretofore been considered as a separate species is given as a race of *mahadeva* flying in Borneo.

(24) **Euthalia lubentina, Cr.**, is confined to China. *Indica*, Fruh., is the race occurring in India, North of Bombay, and Burma. Other Indian races are *arasada*, Fruh., South India, and *pittacus*, Fruh., Ceylon.

(25) **Euthalia franciae, Gray**, flies from Nepal to Bhutan. The form from Assam and Upper Burma is *raja*, Fd., of which *galava*, Fruh., with white spots, represents the extreme dry season form. *Attenuata*, Tytler, must presumably be sunk as a synonym of *raja*.

(26) **Euthalia gupta, DeN.**, and *goodrichi*, Dist., are placed as races of *bellata*, Druce, from Borneo.

(27) **Euthalia sahadeva, M.**, is confined to Nepal, Sikkim and Bhutan; the Assam race is *nadala*, Fruh., and the Burmese one *naigama*, Gr-S.

(28) **Euthalia derma**, Kall., is placed as a race of the Ceylon *evelina*, Stoll; the Burmese race is probably the same as *allona*, Fruh., from Siam.

(29) **Parthenos cyaneus, M.**, is given as a separate species as the valve of genitalia is elongated; the remaining Indian forms are placed as races of *sylvia*, Cr., from New Guinea. Specimens of the Chinese race *sylla*, Don., which has the bases suffused blue green, are found in Tenasserim flying with typical *gambrisius*, Fab.

(30) **Liminitis procris, Cr.**, is the Northern form, of which *chlaena*, Fruh., is the dry season form. The South Indian race is *undifragus*, Fruh. *Calidasa*, M., from Ceylon is treated as a separate species.

(31) **Liminitis trivena, M.**, Himalayas; *ligyes*, Hew., is the race from Kashmir and Kunawur; *hydaspes*, M., the race from Chitral and Western Kashmir.

(32) **Pantoporia pravara, M.**, is confined to North Borneo; the Indian race is *acutipennis*, Fruh.

(33) **Pantoporia larymna, Db.**, is confined to Java; the Indian race is *siamensis*, Fruh.

(34) **Pantoporia kanwa, M.**, is a Java insect; the Indian race is *phorkys*, Fruh.

(35) **Pantoporia kresna, M.**, is the Bornean race of the Sumatran *reta*, M., and the name of the Indian race is *reta moorei*, Fruh.

(36) **Pantoporia ranga, M.**, is confined to North India and Burma, the wet season form being *mahesa*, M.; the South Indian race, which differs in lacking the white submarginal spots on the hindwing is *karwara*, Fruh.

(37) **Pantoporia abiasa, M.**, is from Java; the Indian race is *clerica*, But.

(38) **Pantoporia selenophora, Koll.** The nymotypical form flies in the Himalayas as far East as Sikkim; the Assam race is *bahula*, M., which name also applies to Burmese specimens. Fruhstorfer has seen no specimens from South India but thinks that they are certain to differ from the Northern forms.

(39) **Pantoporia zeroca, M.** The Burmese form is probably the same as the Siamese *galœsus*, Fruh.

(40) **Pantoporia cama, M.** The dry season form is *camida*, Fruh.

(41) **Pantoporia nefte inara, Db.;** the wet season form is *inarina*, But. *Asitina*, Fruh., is the wet season form of the race *asita*, M. For *nivifera*, But., from Mergui the older name is *subrata*, M., described from a grey brown female; the orange red variety of female is *neftina*, Fruh. The Andaman race *rufula*, DeN., is treated as a distinct species.

(42) **Pantoporia sulpitia, Cr.**, is from China; the Burmese race is *adamsoni*, M.

(43) **Neptis hylas, L.** *Astola*, M., is the oldest name for the prevailing form in North India and Burma; *emodes*, M., is the alpine wet season form which we have always known as *astola*, and *adara*, M., is an intermediate form. *Swinhoei*, But., is the South Indian race. *Varmona*, M., is the Ceylon race, of which *disrupta*, M., is the extreme wet season form and *kamarupa*, M., the dry season form.

(44) **Neptis nata, M.**, is confined to Borneo; the Indian race is *cresina*, Fruh.

(45) **Neptis nandina, M.**, from Java has the following races in India; *susruta*, M., Eastern Himalayas and Burma; *hampsoni*, M., from South India; *clinia*, M., from the Andamans, of which *mananda*, M., is the wet season form.

(46) **Neptis soma, M.**, is said to differ very slightly from *nandina*, but the genitalia are quite distinct; the markings in *soma* are always more or less obscured. The Indian races are *soma*, M., from the Eastern Himalayas and Burma of which *adipala*, M., is the wet season form; *kallaura*, *M.*, from South India. The Southern *hampsoni* and *kallaura* are easily distinguished, but the Northern *nandina* and *soma* seem to run into one another.

(47) **Neptis jumbah, M.**, is given from India and Burma, with the following island races; *nalanda*, Fruh., Ceylon; *amorossa*, Fruh., Andamans; *binghami.*, Fruh., Nicobars.

(48) **Neptis zaida, Wd.** The dry season form is *paliens*, Fruh.

(49) **Neptis manasa, M.**, and *nycteus*, DeN., are kept separate, but

Fruhstorfer thinks that *manasa* may have been described from an aberration; in this he is wrong, as I have seen two species of *manasa* and Oberthur has recorded others.

(50) **Neptis vikasi, Hors.** The Sikkim race is given as *harita*, M., with *pseudovikasi*, M., as the wet season form; previous authors have treated these two forms as separate species. The larger race from Assam and presumably Burma, which is not mentioned, is *suavior*, Fruh.

(51) **Neptis columella, Cr.,** is confined to China and the North Indian race is given as *ophiana*, M.

(52) **Neptis radha, M.** *Asterastilis*, Ober., is placed as a race of this species instead of being referred to *narayana*, M.

(53) **Neptis ananta, M.** The dry season form is *sitis*, Fruh.

(54) **Neptis fuliginosa, M.,** from Tenasserim, is kept doubtfully separate from the Philippine *ebusa*, Fd. *Thamala*, M., from Mergui is put as a race of *fuliginosa*.

(55) **Rahinda** is treated as a separate genus. *Assamica*, M., is placed as the Assam race of *paraka*, But.

(56) **Cyrestis rahrioides, M.,** is treated as a distinct species intermediate between *risa*, Db., and *rahria*, M.

(57) **Penthema lisarda, Db.** The Chin Hill race is given as *mihintala*, Fruh; below dull brown instead of reddish, streaks and cell spots above larger.

(58) **Penthema binghami, Wm.,** is put as a race of *darlisa*, M.

(59) **Atella alcippe, Cr.**; the Andaman race is *andamana*, Fruh.

(60) **Calinaga** is placed next *Hestina* in the *Apaturidi* on account of its genitalia resembling those of the *Apatura* group.

The following notes are taken from *Lepidoptera Indica*:—

(61) In the genus *Telicota* are placed *augias*, L., and *bambusæ*, M. *Palmarum*, M., is put under *Corone* and the *dara*, *gola* group in *Padraona*.

(62) **Telicota dara, Koll.,** is confined to the Himalayas and North Burma. The following *dara* like species are given; *satra*, Fruh., a small dark species from Ceylon, which Fruhstorfer himself places as a race of *tropica*, Plotz, from Java; *mæsoides*, But., a small pale species occurring throughout the Indian region; *ottala*, a new species described from one pair from the Karen Hills; *nala*, Plotz, from Kulu and Mussoorie.

The splitting up of *Telicota* into several genera does not appear to serve any useful purpose. In facies except for *gola*, M. and *concinna*, El., and Ed. the species are all very much alike. *Augias* and *bambusæ* (*Telicota* proper) bear in the male a broad stigma along the middle of the discal brown band from vein 1 to 4, also in the male vein 3 is equidistant between 2 and 4. *Rectifasciata* (placed in *Padraona*) bears a rather similar though very obscure brand along the outer edge of the discal band; vein 3 is only a little nearer to 4 than to 2. The *dara* group has a distinct brand in the male lying above and along the middle third of vein 1, a feature which appears to have been overlooked hitherto; *palmarum*, *gola* and *concinna* have no secondary sexual characters; in all these vein 3 is much nearer to 4 than to 2. The females do not differ structurally in any way. The male brands can be clearly seen by the application of benzine.

Superficially the genus can be divided into two groups, (1) *gola* and *concinna* having the basal half of space 3 filled in with yellow and (2) the remainder with a continuous dark brown discal band. The discal band reaches the costa in the *dara* group but not in the remainder.

In the *dara* group Watson in Hesperiidæ Indicæ (1891) placed three species, *viz.*, *dara*, Koll., underside greenish, *mæsoides*, But., underside markings defined with black, *pseudomæsa*, M., underside ochreous and mentions that Hampson obtained all three in the Nilgiris; in his key to the Genera

of Asiatic Hesperiidæ (J. B. N. H. S. IX. 435), he repeated these three species and again in his account of the butterflies of the Chin Hills (J. B. N. H. S. X. 681), where he says that his identification may be wrong, but he is sure that there are three species and also a fourth unnamed, perhaps Swinhoe's *ottala* ; in his list of the butterflies of Myingyan (J. A. S. B. 1897) he gives *mæsides* and another species. DeNiceville in the Gazetteer of Sikkim (1894) and in the butterflies of Mussoorie (J. B. N. H. S. XI. 600) gives *mæsides* and *dara* separately : later (J. A. S. B. 1897) he says *mæsides = dara*. Elwes and Edwards in their revision of the Oriental Hesperiidæ say that they have examined the genitalia of 18 specimens and conclude that there is only one species, *dara*. Swinhoe now asks us to accept 5 species and quotes Doherty as saying that the genitalia of *dara* and *mæsides* are very different and that the former is greenish, the latter tawny below.

Until lately I had placed all my 31 specimens over the label *dara*, but on reading Swinhoe's descriptions I set to and examined the genitalia of all my 23 males and find that I have 5 species, though I have failed to recognise *ottala*.

(*a*) *Tropiea satra* I have from Ceylon and the Andamans. The clasp ends in a broadly triangular point, thus , very different to the rest of the group : the tegumen tapers to a blunt point. It is a small insect with the yellow discal band continent on both wings, not separated by brown veins ; the cell of the forewing is yellow with a short central, not upper, basal brown streak.

(*b*) Next come two males from Mussoorie and Chitral, which I had thought were typical *dara*, but they fall under Swinhoe's *nala*, Plötz. On the forewing the orange spots are small and separated by brown veins ; the spots in 4 and 5 are projected outwards and completly separated from the apical and discal series. On the hindwing there is a small spot in 7 and a larger one below in 6, while in the other species of the group there is rarely one in 6, though usually a spot in 7. The most important difference is in the cilia, which are of an even length throughout, the long hairs being very pale yellow and the short hairs brown ; in the other members of the group the cilia are prominently lengthened at the anal angle, the long hairs being yellow and the short hairs bright orange. The genitalia resemble those of the next two species ; the clasp is thus , deeply excavated in the middle and sharply pointed at the outer edge ; the tegumen tapers towards the apex, ending in an enlarged knob.

(*c*) & (*d*) Of the remainder all but (*c*) fall into two species both as regards genitalia and facies. In (*c*) the apex of the tegumen is very wide and usually excavated in the middle ; in (*d*) it is sharply pointed at the apex. The clasp in (*c*) is shaped thus , the point being sharp and curving over towards the tegumen ; in (*d*) the clasp is the same as in *nala*. In (*c*) the band on the hindwing is not divided into spots by the veins in either sex and on the forewing the spots in 4 and 5 are usually jointed to the apical and always to the discal series ; in (*d*) the discal band on the hindwing is always divided into spots by brown veins and on the forewing the spots in 4 and 5 are never joined to the apical and often not to the discal series especially in the females. I have one specimen of (*c*) from the Palnis and several from Sikkim, Assam and Burma ; (*d*) I have from Ceylon, the Palnis, Central Provinces, Assam and Burma. In size and general appearance the two are very similar ; the undersides are extremely variable and do not serve to separate them. From Swinhoe's account of their distribution, (*c*) would appear to be *dara* and (*d*) *mæsides*, though, as I mentioned above, I am not sure that Kollar's *dara* is not

the same as Plotz's *nala*; perhaps *pseudomassa*, But., will turn out to be the correct name for (*e*). The type of Butler's *mæsoides* is a poor specimen without antennæ from Malacca, and I have a note that the spots on the hindwing are separated by brown veins. Thus it will be seen that the nomenclature of the *dara* group requires a good deal of clearing up.

(*e*) Lastly, I have a single male caught by me in the Palni Hills at 5,000 feet in September 1909, which at the time I thought might turn out to be a different species to any I had caught before. The genitalia are very distinct; the clasp is more or less evenly rounded at the apex, somewhat like the clasp of *satra*; the apex of the tegumen is broad and deeply excavated in the middle. The insect resembles a rather large *dara* or *mæsoides*; the markings on the forewing are much smaller than usual, rather like those in a female of *mæsoides*; on the hindwing the orange band is not divided by brown veins and there is no spot at the end of the cell; below the hindwing except at the dorsum is washed over with greenish yellow of an unusual shade. Apart from the genitalia the differences are small and I rather hesitate from inventing a name for the insect; however in case more are ever discovered, *palnia* will do.

(63) **Halpe.** Species without male brands, *i.e.*, *astigmata*, Swin., *masoni*, M., and *honorei*, DeN., are placed in a new genus *Thoressa*. *Egena*, Fd., is given under the name *brunnea* M. *Separata*, M., and *knyvetti*, El. and Ed. are not, I think, mentioned. *Ornata*, Fd., is sunk as a synonym of *Pithauria marsena*, Hew. *Burmana* is described as a new species from Ataran, said to very like *homolea*, Hew., but possessing a double spot in the cell; Mr. Ellis has sent me several specimens of a *Halpe* from Arakan Yoma and the North Shan States, which I have come to the conclusion are probably *burmana*.

(64) **Iton adamsoni** is described as a new species from Chindwin; the female is said to be suffused green blue on the underside.

(65) **Parnara** is separated into four genera; *Baoris* for *oceia*, Hew., *Caltoris* for *kumara*, M., and its allies; *Chapra* for *mathias*, Fab., etc.; *Parnara* for *guttatus*, Br. and Gr., etc.

(66) **Parnara oceia, Hew.** Dr. Chapman has dissected 14 specimens and finds that there are four species under the name *oceia*, viz., *oceia*, confined to the Philippines; *leechi*, El., confined to China; *farri*, M., the common Indian species; *unicolor*, M., from Sikkim and Assam, a species with no markings on the forewing.

(67) **Parnara onchisa, Swin.,** is given as a distinct species; Elwes and Edwards placed the male as = *austeni*, M., and the female = *moolata*, M.

(68) **Parnara uma, DeN.,** is said to be nearer *Pithauriopsis* than *Parnara*.

(69) **Parnara toona, M.,** is given as *contigua*, Mab.

(70) **Parnara mathias, Fab.,** *midea*, Walker, is the desert form from Turkey to Sind and Cutch. *Subochracea*, M., is given as a separate species.

(71) **Parnara prominens, M.,** is given as *sinensis*, Mab.

(72) **Parnara vaika, Plotz.** (= *philotas*, DeN.,) and *fleritis*, Swin., are given as separate species; they are almost certainly dwarfed forms of *bada*, M., and *colaca*, M., respectively, as is *robsonii*, DeN. of *gremius*, Fab.

(73) **Gegenes nostrodamus, Fab.,** is given from Attock, Chitral and Kulu, and *karsana*, M., as a separate species from Baluchistan, Sind, Bombay and Kumaon; *karsana* is probably the prevailing form in the desert regions and the dry season form elsewhere.

The following notes are taken from the appendix to *Lepidoptera Indica*:

(74) **Danais eryx maghaba, Fruh.,** Sikkim is really from Formosa.

(75) **Epinephele wagneri mandane, Koll.,** Swinhoe records one pair from Quetta.

(76) **Epinephele minoculus, ruh.,** Kashmir. I can find no trace of this butterfly elsewhere; perhaps a variety of *cheena*, M.

(77) **Lethe chandica namura, Fruh.,** N. W. Himalayas is really from Perak.

(78) **Mycalesis medus turbata, Fruh.,** Nicobars is mentioned by Fruhstorfer as the extreme dry season form of the ordinary *medus*, Fab.

(79) **Elymnias malelas ivena, Fruh.,** Sikkim and Assam is really from Siam.

(80) **Athyma gynea, Swin.,** A.M.N.H.S. 1896, page 396. I have not at present access to the original description; the habitat is given as Burma.

(81) **Papilio helena mopa,** Roth, Bhutan is really from Buton in the Phillippines.

(82) **Papilio pitmani leptosephus, Fruh.,** Burma. A form with red markings, the locality of which is doubtfully given as Assam. Jordan thinks that it = *bazilanus*, Fruh., from the Philippines.

(83) **Papilio echo, Ehrman,** Canadian Entomologist, XLI, page 85. I have no access to the original description.

(84) **Papilio clytia lanata, Fruh.,** South India. I can find no trace of this.

(85) **Appias libythes sopara, Fruh.,** a wet season form of *zelmira*, Cr., which is yellow above, from Assam and Tonkin.

(86) **Appias lyncida gelbana, Fruh.,** Nicobars, a female form, which is olive green above and with a yellow hindwing.

(87) **Appias melania fasciata, Fruh.,** Ceylon, a wet season aberration of, *paulina*, Cr., with a black submarginal band on the hindwing below.

(88) **Hebomoia glaucippe aturia, Fruh.,** Tenasserim, Singapore, a race with the red colour more extended into the cell.

NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.)

BY

MAJOR H. H. HARINGTON, Indian Army.

Part II.

GROUP I—(*continued*).

Laughing Thrushes.

TROCHALOPTERUM, Hodgson, 1843.

Jerdon, B.I., ii., p. 42 ; Oates, F.B.I., i., p. 87.

"The following birds differ considerably from *Garrulax*, in their smaller size, more variegated plumage, more rounded wings, and also in habits; for, though still associating in flocks, they do not keep close together, but scatter through the brushwood." (Jerdon.)

"The genus *Trochalopterum*, merely differs from the three preceding genera (*Dryonastes, Garrulax and Ianthocincla*) in having the base of the bill quite free from all bristles and hairs, the nostrils and their membrane being free and exposed."

"The wing is not more rounded nor is it shorter in those genera when compared with other parts of the body."

"The majority of the Laughing-Thrushes of this genus have a bright pattern on the wing; but this character is not of much use apparently as a guide in tracing the affinities with other genera." (Oates.)

Mr. Oates also draws particular attention to the fact, that whilst the majority of Laughing-Thrushes all lay spotless blue or white eggs, a few of the *Trochalopterum* lay spotted eggs, and thought that when the nidification of all were known, those laying spotted eggs would most probably have to be removed.

Whilst working through this section of the Laughing-Thrushes, I was struck with the fact, that the bill and shape of the nostril varied greatly. Some birds having very stout, short, straight bills, with oval and exposed nostrils, others a more delicate and slightly curved one, with long narrow curved nostrils. When I made out a list of the latter, I found that all those, whose nidification is known, lay spotted eggs, whilst those having short straight bills and oval nostrils lay spotless blue eggs. I have therefore come to the conclusion that this group of the Laughing-Thrushes should be divided up into two or more genera or sub-genera.

Further, I find that Gray in his "Genera of Birds," i., p. 225, has already divided up to the *Trochalopterum* into two groups. His '*Pterocyclus*," of which I give his definition, practically agrees with my

own observations, his name is unfortunately preoccupied, I therefore should have liked to propose a name in remembrance of Mr. Oates, who particularly drew attention to the fact that the colour of eggs is a great aid to the classification of birds, and more especially in the *Crateropodinæ*.

At present I have only divided up the *Trochalopterum* into two groups, according to the shape of their bills and nostrils.

KEY.

a. Bill stout, nostrils oval and exposed .. Section I—*Trochalopterum*.
b. Bill slender, nostrils narrow slits .. Section II—(*Pterocyclus*.)

SECTION I.—(TROCHALOPTERUM).

Genus—TROCHALOPTERUM, Hodgson, 1843.

Type—*Trochalopterum squamatum*.

Gray's "Genera of Birds," Vol. i., p. 225.

"Bill moderate with culmen much curved, and the sides compressed to the tip, which is strongly emarginated; the lateral margins slightly curved, and the gonys short and ascending; the gape furnished with a few long bristles; the nostrils lateral, basal, sunk in a groove, with opening anterior, exposed and rounded."

The bill in this group is short, stout, slightly curved, and not notched the nostrils oval and exposed; and no overhanging hairs over the nostrils. They all lay spotless blue eggs.

KEY.

A.—Upper plumage not streaked.
a[1]. Primaries edged blue and black .. .. *T. squamatum*.
b[1]. Primaries edged grey and yellow .. .. *T. subunicolor*.
B.—Upper plumage streaked.
c[1]. A white supercilium .. .. *T. virgatum*.
d[1]. No white supercilium .. .. .. *T. lineatum*.

TROCHALOPTERUM SQUAMATUM, Gould.

The Blue-winged Laughing Thrush.

Ianthocincla squamata, Gould, P. Z. S., 1835, p. 48.
Trochalopterum squamatum, Sharpe, Cat. B. M., vii., p. 367; Oates, F. B. I., i., p. 96.

Description.—As in Oates, F. B. I.
Distribution.—Add Mt. Victoria, Chin Hills, and the Kachin Hills, Bhamo District, Burma.

Mr. Oates draws attention to the variation in the plumage of this species, some birds having the black tail whilst others the bronzed one. I think this must be individual, as I found the same thing in the birds I procured in Bhamo Hills, and a pair I shot both were differently coloured.

[It is certainly not the same variation as between *G. pectoralis* and *G. monliger*, which are perfectly distinct species inhabiting the same localities, the former is a good deal bigger than the latter. I have also shot and trapped pairs of birds on their nests showing that these variations are entirely individual.—E. C. S. B.]

TROCHALOPTERUM SUBUNICOLOR, Hodgson.

The plain coloured Laughing Thrush.

(Hodgson). Blyth, J. A. S. B., xii, p. 952 (1843); Sharpe, Cat. B.M., vii., p. 368; Oates, F. B. I. i., p. 94.

Description.—As in Oates, F. B. I.
Distribution.—Nepal and Sikhim.

TROCHALOPTERUM VIRGATUM, Godwin-Austin.

The Manipur Streaked Laughing Thrush.

Godwin-Austin, P. Z. S., 1874, p. 46; Sharpe, Cat. B. M., vii., p. 379; Oates, F. B. I., p. 100; Baker, *Ibis*, 1895, p. 48.

Description.—As in Oates, F. B. I.
Hab.—Manipur, Cachar, Naga Hills, and Chin Hills on the west of Burma, where it was procured by Col. Rippon on Mt. Victoria, and by Capt. Venning at Haka, and Mr. C. Hopwood, North Chin Hills.

Stuart Baker says he has found this bird breeding in the higher ranges close to Manipur. It appears to build a very neat and compact nest of the usual type, and generally lays 3 eggs, rarely 2 or 4. These are a pale blue, and measure from 1·08″ to ·98″ in length, and from ·76″ to ·78″ in breadth.

TROCHALOPTERUM LINEATUM.

The Streaked Laughing Thrushes.

TROCHALOPTERUM LINEATUM LINEATUM, Vigors.

The Nepal Streaked Laughing Thrush.

Cinclosoma lineatum, Vigors, P. Z. S., 1831, p. 56.
Trochalopterum lineatum, Sharpe, Cat. B. M., vii., p. 377; Oates, F. B. I., i., p. 101, Hartert Vog. Pal. i., p. 636.

Oates in F. B. I. draws attention to the differences between birds from different localities. Dr. Hartert has divided them up into three well marked geographical sub-species.

This race is noticeable for its more highly coloured upper plumage, and very rufous under parts.

Hab.—Nepal.

TROCHALOPTERUM LINEATUM GRISESCENTIOR, Hartert.

The Simla Streaked Laughing Thrush.

Hartert, Vog. Pal. i., p. 636 (1910).

The greyer margins of the feathers much wider, and the streaks on the upper plumage much paler.

Hab.—From Hazara W. Himalayas, Kumaon, Simla, and Southern Kashmir. Also Kohat, the N. W. Frontier, birds from this last locality seem greyer still than typical Simla birds. Capt. Whitehead informs me that this sub-species on the N. W. Frontier leaves the higher ranges in Winter and comes down lower. This is very interesting, and I think if the wings were examined it might possibly show that birds from these localities had a longer wing than the more sedantary races.

TROCHALOPTERUM LINEATUM GILGIT, Hartert.

The Gilgit Streaked Laughing Thrush.

Hartert, Vog. Pal. i., p. 636 (1910).

Lower plumage greyer and paler; the shafts whiter and frequently terminating in a triangular spot.

Hab.—Gilgit and N. Kashmir.

Trochalopterum lineatum imbricatum, Blyth.

The Bristly Laughing Thrush.

Garrulax imbricatus, Blyth, J. A. S. B., xii., p. 951 (1843); Sharpe, Cat. B. M., i., p. 379; Oates, F. B. I., i., p. 102.

Description, etc.—as in Oates, F. B. I.

This is nothing but a geographical race of *T. lineatum* from its type of plumage, some specimens being barely separate from *T. l. lineatum* from Nepal.

Section II.—(PTEROCYCLUS).

Genus—Pterocyclus, Gray.

Type—*P. erythrocephalum.*

Bill moderate, and rather slender, with the culmen gradually curved, and the sides compressed to the tip; the nostrils basal, with the opening large, lunate and partly covered by a membraneous scale. (Gray, Genera of Birds, i., p. 225).

Characteristics.—Bill slender, narrow and slightly curved; compressed towards the tip, which is slightly hooked and notched; nostrils placed near the base of the bill, with a large sunken opening, the actual nostril consisting of a long, narrow, lunate opening; a few hairs overhanging the gape; tail, greatly graduated and longer than the wing; wing, the first four primaries graduated.

All the birds of this group whose nidification is known, lay spotted eggs. The Southern Indian birds, I think might be placed in a sub-group by themselves, they all have a dull plumage, otherwise, from the shape of their bills and nostrils, and from the colour of their eggs they belong to this group.

Key.

A.—Either crown, or nape, or both chestnut .. *T. erythrocephalum.*

B.—No chestnut on head.

a^1. Wings brightly coloured.

a^2. Wings chiefly crimson; tail back .. *T. phœnicium.*

b^2. „ „ „ tail crimson. *T. milnei.*

c^2. „ „ bright yellow.

a^3. Tail not tipped with white .. *T. affine.*

b^3. Tail tipped with white .. .. *T. variegatum.*

b^1. Wings of a dull colour

d^2. Breast rufous .. .. *T. cachinnans.*

e^2. „ whitish streaked ashy .. *T. jerdoni.*

Trochalopterum erythrocephalum—melanostigma.

The Chestnut-headed Laughing Thrushes.

This sub-section falls into two further natural sub-divisions, the first of which *T. e. erythrocephalum* (Vigors) may be taken as the type, has the upper back and breast conspicuously spotted, and extends from the N. W. Himalayas, through Nepal, Sikhim and Bhutan to Assam and Manipur, from thence down the Chin Hills on the West of Burma, and most probably along the unexplored ranges to the north of Burma to the Bhamo Hills.

The second sub-division of which *T. m. melanostigma* (Blyth) is the type, have the upper back, neck and breast uniform, and not spotted. These inhabit the mountains of the Malay Peninsula, extending northwards into Tenasserim, the Shan States and Karannee

In the Salween-Mekong water-shed, we have the connecting link between the spotted and unspotted groups. In the British Museum there are three specimens of *T. melanostigma*, collected by Mr. H. N. Thompson, which have the breast obsoletely spotted, the feathers of the breast also being edged with pale grey, these as connecting links I think are worthy of sub-specific rank.

KEY.

A.—Back and breast with large dark spots.
  a. These spots black.
    a^1. No conspicuous grey supercilium.
      a^2. Ear-coverts chestnut, tipped black and white .. .. *T. e. erythrocephalum.*
      b^2. Ear-coverts black margined pinkish white .. .. *T. e. nigrimentum.*
      c^2. Ear-coverts chestnut like the crown .. *T. e. erythrolæma.*
    b^1. A conspicuous grey supercilium.
      d^2. Ear-coverts chestnut .. .. .. *T. e. godwini.*
      e^2. Ear-coverts grey with black shaft streaks .. .. *T. e. woodi.*
  b. Spots on breast and back brown and lunate in shape .. .. *T. e. chrysopterum.*
B.—No spots on back or breast.
  c. Chin and throat only rufous .. .. *T. m. melanostigma.*
  d. Chin, throat and breast rufous .. .. *T. m. ramsayi.*

Distribution.—*T. e. erythrocephalum* (Vigors), N. W. Himalayas to Nepal; *T. e. nigrimentum* (Hodgson), Nepal to Daphla Hills, Assam; *T. e. chrysopterum* (Gould), Khasia Hills (only); *T. e. godwini* (Harington), Cachar and Naga Hills and Western Munipur; *T. e. erythrolæma* (Hume), E. Manipur and Chin Hills; *T. e. woodi*, sub-sp., nov., N. Shan States and probably the Bhamo Hills; *T. m. ramsayi* (O. Grant), Karennee; *T. m. melanostigma* (Blyth), Southern Shan States and Tenasserim; *T. m. peninsulæ* (Sharpe), Malay Peninsula.

TROCHALOPTERUM ERYTHROCEPHALUM ERYTHROCEPHALUM, Vigors.

The Himalayan Chestnut-headed Laughing Thrush.

Cinclosoma erythrocephalum, Vigors, P. Z. S., 1831, p. 171.
Trochalopterum erythrocephalum, Oates, F. B. I., i., p. 89; Sharpe, Cat. B. M., vii., p. 360.

Description.—As in the F. B. I. breast and neck spotted with black; forehead, crown and nape chestnut; ear-coverts chestnut tipped black and white; chin and throat black tinged with chocolate; the underparts much paler than in any of the other allied races.

"The only variation this bird exhibits is in the colour of the ear-coverts; Nepal birds have a great deal of black on the ear-coverts, and the black diminishes in quantity as we proceed towards the north-west, till on arrival at Chumba the ear-coverts are almost entirely chestnut." (Oates.)

Distribution.—The Himalayas from Chamba to Nepal.

TROCHALOPTERUM ERYTHROCEPHALUM NIGRIMENTUM, Hodgson.

The Sikhim Chestnut-headed Laughing Thrush.

T. chrysopterum, Sharpe, Cat. B. M., vii., p. 362.
T. nigrimentum, Oates, F. B. I., i., p. 91.

Description.—As in the F. B. I. breast and neck spotted with black; the forepart of the head dark rufous and the feathers black-shafted; crown

and nape chestnut; sides of the head dark grey; ear-coverts black margined pinkish white; chin and throat black; the amount of rufous on forehead varies greatly.

Distribution.—Sikhim, Butan, Daphla Hills, and possibly Tibet.

TROCHALOPTERUM ERYTHROCEPHALUM CHRYSOPTERUM, Gould.

The Shillong Chestnut-headed Laughing Thrush.

Ianthocincla chrysoptera, Gould, P. Z. S., 1835, p. 48.
T. ruficapillum, Sharpe, Cat. B.M., vii., p. 363.
T. chrysopterum, Oates, F.B.I., i., p. 90.

Description.—As in the F.B.I. Breast and neck spotted with brown; forehead, lores and continued back as a supercilium ashy-grey; crown and nape chestnut; ear-coverts rufous to ashy rufous; chin and throat dark chestnut.

Distribution.—The Khasia Hills, this sub-species is peculiar to the "Assam back-water."

Nesting.—[The breeding reason of this sub-species commences in the end of April and ceases in the first week of June though a few odd nests containing eggs may be found as late as August. The nest is a wide shallow cup of moss, roots, vents, grasses and dead leaves, lined with rootlets, fern rachæ and tendrils or, occasionally, fine grass. It is fairly well built and in general appearance much like many thrushes nests. No attempt seems to be made at concealment and it is usually placed in some tall, thinly foliaged bush about six feet from the ground, in Pine or Evergreen Forest.

The eggs are generally two in number, sometimes three and very rarely four. In type of colouration they are like the eggs of *erythrocephalum*, but are more boldly marked with a few black, or deep purple red spots blotches or lines. In a few eggs their markings are very scanty and in some are more numerous than ever the care with the previous birds' eggs.

They vary in length between 1·10 × 1·30 and in breadth between 87″ and 99″, the average of 50 eggs being 1·22″ × 93.″—E. C. S. B.]

TROCHALOPTERUM ERYTHROCEPHALUM ERYTHROLÆMA, Hume.

Hume's Chestnut-headed Laughing Thrush.

T. erythrolœma, Hume, S.F., x., p. 153 (1881); Oates, F.B.I, i., p. 90.
T. holerythrops, Rippon, Bul. B.O.C., xiv., p. 83. Harington. Bul. B. O.C., xxxiii., p. 93.

"Like *T. erythrocephalum*, but the cheeks and throat uniform with the crown"—(Hume).

Up to the present only one specimen of this species has been known, the type which was obtained by Hume near Matchi, Eastern Manipur.

There are, however, numerous specimens of *T. holerythrops*, Rippon, from the Chin Hills, which agree with the type-specimen of *T. e. erythrolœma* in showing no signs of the grey supercilium so noticeable in *T. e. godwini*, Harington, from N. Cachar and W. Manipur. It must have been with specimens of this subspecies that Col. Rippon compared his birds from the Chin Hills, and not with the type of *T. erythrolœma*, Hume, as Col. Rippon says in his description that his *T. holerythrops* is similar to *T. erythrolœma*, but has no grey supercilium.

The name *T. holerythrops* is, therefore, synonymous with *T. e. erythrolœma*, Hume.

Description.—As in the F.B.I. breast and neck spotted; forehead greyish; entire head, and nape chestnut; no grey supercilium; ear-coverts dull chestnut; chin dusky, throat dull chestnut slightly darker than the head.

Nesting.—[A series of its eggs sent me from the Chin Hills agree entirely with those of the last sub-species, but are somewhat paler in ground colour in most cases.—E.C.S.B.]

Distribution.—From the eastern ranges of Manipur along the Chin Hills to Mt. Victoria; in the northern Chin Hills it has been procured, both by Mr. C. Hopwood, who, I believe, also got its nest and eggs; and by Capt. Venning at Haka.

TROCHALOPTERUM ERYTHROCEPHALUM GODWINI, Harington.

Godwin-Austen's Chestnut-headed Laughing Thrush.

Harington, Bul. B. O. C., xxxiii., p. 92, 1914.

Adult—Similar to *T. e. erythrolæma*, Hume, from E. Manipur, but differs in having a conspicuous grey supercilium; the forehead much greyer, and the underparts less heavily spotted.

This sub-species is intermediate between *T. e. erythrolæma* from E. Manipur and the Chin Hills and *T. e. chrysopterum*, Gould, from the Khasia Hills. It differs from the latter in having well-marked black spots on the neck and breast, instead of brownish lunar markings, but it resembles the latter in having a conspicuous grey supercilium.

Hab.—North Cachar Hills.

Type in the British Museum: adult. Hengdan Peak. Colonel H. H. Godwin-Austen, Coll.

Obs.—*T. e. chrysopterum*, Gould, is peculiar to the Khasia Hills, from which locality there are numerous specimens in the British Museum. Although Gould's type is labelled "Hymalayas," it agrees with the birds from the Khasia Hills. These have also been described by Blyth as *T. ruficapillum*, consequently there has been a good deal of confusion over these two names.

TROCHALOPTERUM ERYTHROCEPHALUM WOODI., subs. nov.

Wood's Chestnut-headed Laughing Thrush.

Intermediate between *T. e. nigrimentum* (Hodgson), from Nepal, and *T. e. melanostigma* (Blyth), from Tenasserim. Differs from the former in having the ear-coverts and sides of the head silvery ashy-grey with black shaft stripes, instead of black edged with pinkish white; and the spots on the breast and back triangular in shape instead of roundish. Differs from the latter in having the neck and breast spotted, and in having no black coverts to the primaries.

Description.—Lores black; forehead brownish-ashy with black shaft streaks; crown and nape chestnut; a short grey supercilium; ear-coverts and sides of the head ashy-grey with black shaft streaks; chin black; throat dark brownish; neck and breast brown tinged with vinous, and with conspicuous black triangular shaft streaks; back and rump olive green tinged with rufous on the upper back; tail olive grey edged with green; wings as in *T. e. nigrimentum* lower breast and abdomen olive-brown tinged with rufous; flanks and vent olive.

Wing 107; *tail* 122; *culmen* 20; *tarsus* 37. *Type*, collected by Capt. H. Wood, R. E., at Loi-song, North Shan States, Burma, 7th January, and presented the Museum of the B. N. H. Society. The type has been presented by the Society to the British Museum.

Obs.—In the British Museum there is a specimen collected by Col. Rippon, July 1901, in the Kauri Kachin Hills, Bhamo District. This is a young bird, and most probably of this species, as it is quite distinct from *O. e. nigrimentum*, under which name it is catalogued.

I have much pleasure in calling this very good sub-species after Capt. H. Wood, R.E.

Trochalopterum melanostigma ramsayi, O. Grant.

The Karennee Chestnut-headed Laughing Thrush.

O. Grant, Bul. B. O. C., xiv., p. 92, 1914.

"*Adult male and female.*—Most nearly allied to *T. melanostigma* (Blyth), but differing in having the chestnut of the chin and throat continued over the entire breast and belly, gradually decreasing in intensity towards the vent. In this respect the present species approaches *T. peninsulæ*, Sharpe."

'Iris deep chocolate, bill black, legs pinkish brown.'

Hab.—Karennee, extending to the fine forests in the Salween District.

Trochalopterum melanostigma melanostigma,* Blyth.

Blyth's Chestnut-headed Laughing Thrush.

Blyth, J. A. S. B., xxiv., p. 268 (1855); Sharpe, Cat. B. M., vii., p. 364; Oates, F. B. I., i., p. 92.

Description.—As in the F. B. I. breast and neck unspotted; forehead, lores and chin a deep black; a short supercilium grey; ear-coverts pinkish grey and black shafted; crown chestnut contracting to a point on the nape.

Distribution.—Muleyit Mt., Tenasserim, from here it works northwards into the Shan States, but not Karennee where *T. m. ramsayi* is found.

Note.—The Shan States birds appear to be much greyer than those from Tenasserim. I have lately seen a pair of skins, in the Society Collection, collected by Capt. H. Wood, R.E., in the Northern Shan States, these appear to be very grey with no rufous tinge on the lower plumage. Unfortunately I have not been able to compare them with Tenasserim specimens, and therefore unable to say whether they are that sub-species or distinct.

Trochalopterum phœniceum.

The Crimson-winged Laughing Thrushes.

This species is represented by three well marked geographical races, extends from Nepal to Bhutan and the hills north of Assam (*T. p. phœniceum*). To the south of the Brahmaputra, in the Garo and Khasia Hills, and extending to Manipur and the Chin Hills we have *T. p. bakeri*. Down the eastern hills of Burma we get *T. p. ripponi*, inhabiting the Kachin Hills, east of Bhamo, and the Shan States. They all lay very handsome blue eggs, boldly spotted and streaked with dark reddish-purple.

Trochalopterum phœniceum phœniceum, Gould.

The Nepal Crimson-winged Laughing Thrush.

Ianthocincla phœnicea, Gould, Icon. Av., pl. 3 (1837).

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* Trochalopterum melanostigma peninsula, Sharpe.

The Malay Chestnut-headed Laughing Thrush.

Sharpe, P. Z. S., 1887, p. 436.

The neck and breast unspotted.

Lores and forehead black: an ashy-grey supercilium commencing from behind the eye to the nape; ear-coverts dark brown; crown dark chestnut continued to a point on the nape; chin black: throat and the whole lower plumage chestnut brown.

Hab.—Mts. of Perak, the Malay Peninsula.

Nidification unknown.

Trochalopterum phœniceum.—Sharpe, Cat. B.M., VII., p. 371, Oates, F. B.I., i., p. 93.

Description, etc.—As in Fauna. B. I.

Distribution.—Nepal, Sikkim and Bhutan.

TROCHALOPTERUM PHŒNICEUM BAKERI, Hartert.

The Assam Crimson-winged Laughing Thrush.

Hartert, Bul., B. O. C., xxiii., p. 10 (1909).

Similar to *T. phœniceum*, Gould, from Sikhim.

Differs in being paler both above and below; with a distinct grey wash along the middle of breast and abdomen; it is also slightly smaller.

Distribution.—The mountain ranges south of the Brahmaputra, and also the Chin Hills, on the West of Burma; two specimens from Mt. Victoria appear to be nearest to this sub-species.

Nesting.—Nest eggs similar to *T. p. phœniceum.*

TROCHALOPTERUM PHŒNICEUM RIPPONI, Oates.

The Burmese Crimson-winged Laughing Thrush.

Trochalopterum ripponi, Oates, Bul. B. O. C., xi., p. 10, 1900; Rippon, Ibis., 1901, p. 529; Harington, B. N. H. S. J., xix., p. 114.

"Allied to *T. phœniceum* from the Himalayas, but differing from that species in many important points, the crimson of the head is much brighter and extends to the whole side of the head, the supercilium, forehead, chin and cheeks, even tinging the throat. The later, together with the whole lower plumage is greyish-yellow not fulvous and olive-brown. The whole crown is dark plumbeous and the remainder of the upper plumage with the wing coverts is olive grey. The tail feathers are not tipped with orange but more narrowly with ochraceous, the lower aspect of the outer feather alone being orange." (Oates).

Wing 3·4; tail 4; Tarsus 1·3 inches.

Nesting.—Fairly common in the Bhamo Hills, Col. Rippon says the commonest Laughing Thrush from 4,000-6,000 ft. in the Southern Shan States. I found several nests in the Bhamo Hills, these were of the usual family type and the eggs very similar to those of *T. p. phœniceum*, and measured 1·01 × ·75 inches.

TROCHALOPTERUM MILNEI.*

The Red-tailed Laughing Thrushes.

These, the handsomest of the Laughing Thrushes, at present consist of three well marked races, which inhabit the mountainous districts of China Yunnan and the N. E. Hills of Burma. The nidification of one sub-species is at present known, this is remarkable for laying white eggs spotted with red. Mr. Stuart Baker informs me that he has received similar eggs from the Chin hills, so in all probability there is still an undescribed sub-species in that locality.

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* TROCHALOPTERUM MILNEI MILNEI, David.

The Chinese Red-tailed Laughing Thrush.

David, Ann. Sci. Nat. (5), XIX., Art. 9, (1874); Sharpe, Cat. B. M., vii, p. 372.

"Crown of head and upper parts of a buffy-rufous colour; ear coverts pure white; throat and lores black; back olive, with the large feathers edged with a dark border; rump and upper tail coverts of a golden-olive tint; lower part ashy-olive passing to greenish on the neck; breast, flanks, under tail-coverts and tidial plumes; upper surface of the tail bright red, lower surface blackish; quills above brilliant and glossy red with the inner neck of the innermost secondaries white: bill and feet black: iris brown." (Sharpe).

Hab.—W. Fokien, Kuatin, China.

TROCHALOPTERUM MILNEI SHARPEI*, Rippon.

The Burmese Red-tailed Laughing Thrush.

Trochalopterum sharpei, Rippon, Bul. B. O. C., xii., p. 13 (1901) ; Harington, B. N. H. S. J., xix., p. 113, *ibid*, Ibis, 1914, p.

Similar to *O. m. milnei*, David. Differs in having the ear-coverts pale ashy-grey.

Distribution.—The Bhamo Hills, and Keng Tung State, Burma, probable distribution the mountains bordering N.-E. Burma.

Nesting.—I found this, the handsomest of all the numerous Burmese Laughing Thrushes, breeding at Sinlum in the Bhamo Hills. The nest is of the usual type, but the eggs are quite unlike any of the known members of this genus. Being pure white, spotted either with dark-red or black. And measure 1·13 × ·82 inches.

TROCHALOPTERUM AFFINE AFFINE†, Hodgson.

The Nepal Black-faced Laughing Thrush.

Garrulax affinis (Hodgson), Blyth, J.A.S.B., xii., p. 950 (1843)

Trochalopterum affine, Sharpe, Cat. B. M., vii., p. 357 ; Oates, F. B. I., i., p. 94.

Description.—As Oates, F. B. I.

Distribution.—Nepal, Sikkim and Bhutan at high levels. Nothing appears to be recorded as to its nesting and eggs. In this species the first five primaries are graduated.

TROCHALOPTERUM VARIEGATUM VARIEGATUM, Vigors.

The Eastern Variegated Laughing Thrush.

Cinclosoma variegatum, Vigors, P.Z.S., 1831, p. 56.

Trochalopterum variegatum, Sharpe, Cat. B. M., vii., p. 359 ; Oates, F.B.I., i., p. 95.

Description.—As in Oates, F. B. I.

Distribution.—Himalayas Chumba to Nepal.

TROCHALOPTERUM VARIEGATUM SIMILE, Hume.

The Western Variegated Laughing Thrush.

Trochalopterum simile, Hume, Ibis, 1871, p. 408 ; Oates, F. B. I., i., p. 96.

Description.—As in Oates, F. B. I.

Distribution.—Kohat, the N.-W. Himalayas and Kashmir.

TROCHALOPTERUM CACHINNANS CACHINNANS, Jerdon.

The Nilghiri Laughing Thrush.

Crateropus cachinnans, Jerdon, Madras Journ., x., p. 7 (1839).

Trochalopterum cachinnans, Sharpe, Cat. B. M., vii., p. 373 ; Oates, F. B. I., i., p. 98.

Description.—As in Oates, F. B. I.

Distribution.—Nilgiris, S. India.

**Allied sub-species.*

O. m. formosa, J. Verr, Nouv. Arch. du. Mus. v. Bull. p. 35 (1869) ; Sharpe, Cat B. M., vii., p. 372.

Hab.—Western Szechuen.

† TROCHALOPTERUM AFFINE BLYTHI, Verr.

Verreaux, Nouv. Arch. Mus. Parss. IV. Bull, p. 37 (1870) ; Hartert, Vogl. Pal., p. 633.

Hab.—Szechuen, China.

TROCHALOPTERUM AFFINE OUSTALETI, Hartert.

Ianthocincla a. oustaleti, Hartert, Vogl. Pal, i., p. 633 (1910).

Hab.—Yunnan.

Trochalopterum cachinans cinnamomeum, Davison.

Davison's Laughing Thrush.

Trochalopterum cinnamomeum, Davison, Ibis., 1886, p. 204; Oates on F. B. I., i., p. 98.

I have only been able to examine one specimen of this species, the type, and it seems to me to be a young bird: more specimens are required to get the correct description. Otherwise as in F. B. I.

Distribution (uncertain).—S. India, the hills East of Cannanore.

Trochalopterum jerdoni jerdoni, Blyth.

The Coorg Laughing Thrush.

Garrulax jerdoni, Blyth, J. A. S. B., xx., p. 522 (1851).
Trochalopterum jerdoni, Sharpe, Cat. B. M., vii., p. 373; Oates, F. B. I., i., p. 99.

Description.—As in Oates, F. B. I.
Distribution.—The Coorg Hills, S. India.

Trochalopterum jerdoni fairbanki, Blanford.

The Palni Laughing Thrush.

Blanford, J. A. S. B., xxxvii, pt. ii., p. 175 (1868); Sharpe, Cat. B. M., vii., p. 374; Oates, F. B. I., i., p. 99.

Description.—As in Oates, F. B. I.
Distribution.—Anamali and Palni hills.

[The nest and eggs of this species have very seldom been taken. A clutch of eggs received by me from the late Rev. Howard Campbell are exactly like the eggs of *T. cachinans*, but rather brighter in colour and more totally marked than any I have seen of that species. They measure 1·06×·74″.—E.C.S.B.]

Trochalopterum jerdoni meridionale, Blanford.

The Travancore Laughing Thrush.

Blanford, J. A. S. B., xlix, p. 142 (1880); Sharpe, Cat. B. M., vii p. 375; Oates, F. B. I., i., p. 100.

Description.—As in Oates, F. B. I.
Distribution.—Travancore.

[The only clutch of eggs yet taken of this bird were obtained by Mr. J. Stewart on the 10th June 1906 at Achencoil Gap, Travancore. The nest was a typical *Trochalopterum* nest placed in a scrubby bush in dense forest and the eggs are like very brightly coloured specimens of *T. cachinans*, but more boldly marked than the majority of this latter bird's eggs and with the markings much more numerous. They measure ·99″×·76″, 1·02″×·76″ and ·98″×·75″. The texture is close and fine, and there is a considerable gloss. They are very thrush-like eggs in their general appearance.—E.C.S.B.]

Trochalopterum ellioti ellioti*, Verreaux.

Elliot's Laughing Thrush.

J. Verreaux, Nouv. Arch. du Mus., vi., Bull, p. 36 (1870); Sharpe, Cat. B. M., vii, p. 370; Hartert. Pal. Vog. i., p. 631.

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* Trochalopterum ellioti yunnanense, Rippon.

Trochalopterum e. yunnanense, Rippon Bull. B. O. C., xix., p. 32 (1906)
Hab.—Yunnan, the Yangtze Valley.

Description.—General colour above earthy brown washed with olive, head paler; forehead dove-grey; lores dark-brown; ear-coverts pale-brown, faintly tipped with white, back absolutely tipped dark brown with white lips; tail ashy, washed with golden green; outer edge of primaries pale greyish blue; secondaries green; chin, throat, and breast, pale chocolate, each feather faintly edge with white; flanks greyish olive; abdomen and undertail coverts vinous-brown.

Wing: 95-115 mm.; tail 145 mm.; culmen 15 mm.

Distribution.—W. Szechuen, Moupin, Chensi, Ta-Tsien-Lou and possibly Tibet.

Trochalopterum henrici, Oustalet.

Prince Henry's Laughing Thrush.

Trochalopterum henrici, Oustalet, Ann. Sci. Nat. (7), xii., p. 274 (1891); Hartert, Pal. Vog. i., p. 632.

Garrulax tibetanus, Dresser, P. Z. I., 1905, p. 54; O. Grant, Bul. B. O. C., xv., p. 94.

Description.—Upper plumage greyish olive brown; crown slightly darker, lores and a patch in front of and behind the eye chocolate; a short white supercilium over the eye; ear-coverts dark chocolate; and a broad white stripe on the cheeks; primaries edged greyish; under parts the same colour as upper plumage but paler; under tail coverts chocolate.

Wing 110-115 mm; tail 150 mm; culmen 23 mm.

Distribution.—Tibet. It has lately been procured by Capt. F. M. Bailey at Shoaka, 9,000 ft., in the Mishmi Hills.

GROUP II.

Babblers.

Argya and Crateropus.

Argya, Lesson, (1831).

Oates, F.B.I., i., p. 105.

" The birds of this genus differ from the Laughing Thrushes in many points of structure. The covering membrane of the nostril is partially clothed with plumes and the feathers of the forehead and those round the base of the bill are short, firm and close. The tail is also relatively much longer and greatly graduated, each outer feather being only about half the length of the tail.' (Oates).

The *Argya* have a slightly more pointed wing. The first three primaries being graduated; the bill is slightly curved, and the nostrils exposed, with no over-hanging hairs; rictal bristles very short. They all lay characteristic rich, "verditer blue " eggs, which are highly glossy and spotless.

Argya and *Crateropus* have a more Western habitat to the other genera comprising the *Timeliides*, and are found in Africa as well as India; Burma appears to be their most Easternly limit.

Argya earlii, Blyth.

The Striated Babbler.

Malacocercus earlii, Blyth, J.A.S.B. xiii, p. 369 (1844).

Argya earlii, Sharpe, Cat. B.M. vii, p. 392; Oates, F.B.I. i., p. 105.

Description.—As in Oates, F.B.I.

Distribution.—Cutch and Indus Valley; and from the Saharanpur District, along the base of the Himalayas to Behar; Bengal to Assam and southwards from the Bhamo District to Pegu.

I have only been able to examine one specimen from Bannu, this is smaller and paler than typical *A. earlii* ; also eggs which I have received from Dera Ismail Khan are decidedly smaller than those I have taken myself at Bhamo, therefore I think that possibly the Derajat bird may be found to form a distinct sub-species.

ARGYA CAUDATA CAUDATA,* Dumeril.

The Common Babbler.

Cossyphus caudatus, Duméril, Drapiez. Class d'Hist. Nat., x., p. 216 (1826).
Argya caudata, Sharpe, Cat. B. M., vii., p. 393.
Argya eclipesi (Hume), Sharpe, vii., *t.c.*, p. 394.
Argya huttoni (Blyth), Sharpe, vii., *t.c.*, p. 394.

Description.—As in Oates, Fauna, B. I.
Distribution.—" Every portion of India proper, Sind to Bengal from the Himalayan to the South, probably Palni hills, but exact distribution in the south at present uncertain. Also the Laccadive Islands where it most probably has been introduced. "

ARGYA GULARIS, Blyth.

The Burmese White-throated Babbler.

Chatorhea gularis, Blyth, J. A. S. B., xxiv., p. 478 (1855).
Argya gularis, Sharpe, Cat. B. M., vii., p. 396; Oates, F. B. I., i., p. 107 ; Harington, B. of B., p. 12 ; *id.* ibis 14, p. 10.

Description.—As in Oates, F. B. I.
Distribution.—The dry-zone in Upper Burma. This is a common familiar bird round Mandalay, being alike common about human habitations and in jungle. It practically breeds throughout the year, building the usual babbler type of nest, and lays from 3 to 4 beautiful turquoise-blue eggs which measure ·88 × ·68 inches.

ARGYA MALCOLMI, Sykes.

The Large Grey Babbler.

Timalia malcolmi, Sykes, P. Z. S., 1832, p. 88.
Argya malcolmi, Sharp, Cat. B. M., vii., p. 398; Oates, F. B. I. i., p. 108.

Description.—As in Oates, F. B. I.
Distribution.—The Peninsula of India from the Punjab to Sind, Rajputana, the United Provinces down to Mysore and the Nilghiris ; to the eastwards its distribution not yet thoroughly determined.

ARGYA SUBRUFA, Jerdon.

The Rufous Babbler.

Timalia subrufa, Jerdon, Madras Journ. L. S., p. 259 (1844).
Argya subrufa, Sharpe, Cat. B. M., vii, p. 390 ; Oates, F. B I., i., p. 109.

Description.—As in Oates, F. B. I.
Distribution.—The Western Ghats and from Coonoor and Kotagiri on the Nilghiris up to Khandala near Bombay.

**Allied sub-species.*

Argya caudata huttoni, Blyth, J. A. S. B., xvi., p. 476 (1847) ; Hartert., Pal Vog. i., p. 622.
Distribution.—Afghanistan and Baluchistan.
Argya caudata altirostris, Hartert., Pal. Vog., i., p. 622 (1910), The Persian Gulf.

I have examined the type of *A. hyperythra*, Sharpe, it is one of the Gould collection, and labelled the "Peninsula of India," it is certainly very rufous, but as it is such a very old skin, I think that this rufous tinge may possibly have been caused by chemical action, as there are numerous old skins in the Museum collection of other species; many of which show rather a dull rufous shade quite unlike that of the newer specimens.

Argya longirostris, Hodgson.

The Slender-billed Babbler.

Pyctorhis longirostris, Hodgs., Moore, P. Z. S., 1854, p. 104.
Timelia longirostris, Sharpe, Cat. B. M. vii., p. 509.
Argya longirostris, Oates, F. B. I. i., p. 109.
Description.—As in Oates, F. B. I.

This undoubtedly as Oates points out belongs to this group and is quite distinct from the *Timeliinæ*, it also lays blue eggs which almost at once places it amongst the Babblers. I think, however, that it should have a distinct genus to itself, on account of its very slender long bill, and the feathers of the crown being not so stiff, only few feathers on the forehead having stiffened shafts.

Distribution.—The Nepal Terai, Bhutan, Assam and Manipur. Col. Rippon, Ibis 1901, p. 529, states that he received one specimen from Bampon, S. Shan States. I have carefully examined all the specimens in the British Museum and cannot find any from Burma. There is, however, a skin of a Suya, *Suya c. cooki*, collected by Col. Rippon from Bampon, on the label which is written in pencil "*Argya longirostris*," this may possibly be the bird he refers to. There is no reason why this species should not be found in the huge expenses of elephant-grass in the Upper Chindwin District.

Nesting.—["This bird breeds not uncommonly on the high grass plateaus in the Khasia hills. The nest is exactly like that of the rest of the birds of the genus; and may be placed in amongst the roots of some tuft of dense grass, in a bush, or tangle of brambles, or even on an old stump or in a clump of weeds, or on a broken down wall or bank.

"I have been peculiarly unfortunate in getting full clutches of this bird's eggs but the usual full clutch will undoubtedly be four."

"They are, when freshly taken and blown, a rather exceptionally bright blue, and many are also paler than is generally the case with *Argya* and *Crateropii* eggs. They measure about ·90″ × ·70″."— E. C. S. B.]

Crateropus, Swainson, 1831.

Oates, F.B.I., i., p. 110.

"The genus *Crateropus* differs from *Argya* in its shorter tail, which is about equal to the wing, and in its shorter bill. The tail is also much less graduated, the outer feathers being about two-thirds the entire length of the tail. In habits the two genera are very similar, as also in their mode of nidification, and the colour of their eggs."—Oates.

The wing is not so rounded as in the "Laughing thrushes" and the first four primaries are graduated.

I think the generic name of *Crateropus* should be restricted to African birds of this genus which appear to me to be quite distinct from those from India, and that the name *Malacocercus*, Hodgson, be revived for the Indian birds of this genus.

Crateropus terricolor terricolor, Hodgson.

The Bengal Babbler.

Turdus canorus,† Linn. Syst. Nat. i., p. 293, (1766).
Pastor terricolor, Hodgs, J.A.S., B.V., p. 771 (1836).
Crateropus canorus, Sharpe, Cat. B.M., vii., p. 478, Oates, F. B. I., i., p. 111.
Malacocercus terricolor, Jerdon, B. of I.. ii., p. 59.

Description.—"Above brownish ashy, paler and somewhat cinerous on the head and neck: browner on the back, where the feathers are faintly pale shafted; quills brown, with outer webs paler and narrowly bordered with ashy; tail reddish brown, faintly barred, and the outer feathers tipped with pale whity-brown; beneath pale ashy-brown on the throat and breast, the feathers very faintly edged and shafted lighter; abdomen, vent, and under tail coverts pale fulvescent."—Jerdon.

Distribution.—Sind and the whole of Northern India, Bengal and also in Nepal and Sikhim. Where this sub-species meets *C. malabaricus,* Jerdon, in the south at present uncertain.

Crateropus terricolor malabaricus, Jerdon.

The Southern Indian Jungle Babbler.

Malacocercus malabaricus, Jerdon, B. of I., ii., p. 62., 1847.

Description.—"Very like *M. terricolor* but somewhat darker in colour with broader and more distinct pale mesial streaks on the feathers of the back, and especially *of the breast* the tertiaries are but very obscurely striated, but the tail is distinctly so."—Jerdon.

Distribution.—"The greater part of the Peninsula of India, in the Carnatic, the N. Circars, the Malabar Coast, the slopes of the Nilgiris, and the tableland, in suitable places as far as Nagpore and to the latitude of Bombay on the Western Ghats."—Jerdon.

I consider this a very good geographical race, birds from the Nilgiris being quite distinct from those from N. India; no doubt they grade from one into the other, and the exact locality where one begins and the other ends has not yet been determined.

Birds of this sub-species from Coonoor were undoubtedly mistaken by Oates for *C. striatus.* (See note *C. g. striatus.*)

Crateropus griseus griseus, Gm.

The White-headed Babbler.

Turdus griseus, Gm. Syst. Nat., i., p. 824., (1788).
Crateropus griseus, Sharpe, Cat. B. M., vii., p. 840; Oates, F. B. I., i., p. 112.

Description.—As in Oates, F. B. I., I think this sub-species may possibly have two phases of plumage, one with the head white, and the other colour red like the back. (See remarks *C. g. striatus* from Godavery Valley).

Distribution.—Southern India up to a line from Ellore, Secunderabad and Belgaum.

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† In the original description of *T. canorus.* it is mentioned that the species came from China, and that it has a white eye-brow and a rufous tinge to the plumage. this clearly cannot refer to the Indian bird.

Trochalopterum canorum., Linn. is also referred to in the original description in Linn. System Nat., p. 293, 1766, and as the description undoubtedly refers to this species from China, the name *canorus* cannot therefore be equally applied to the Indian bird, therefore, Hodgson's name *terricolor* must be used.

Crateropus griseus striatus, Swainson.

The Ceylon Babbler.

Malacocerus striatus, Swains, Zool. Ill., p. 127 (1831).
Crateropus striatus, Sharpe, Cat. B.M., vii., p. 481; Oates, F.B.I., i., p. 112.

Description.—As in Oates, F.B.I.
Distribution.—Ceylon.

I have carefully examined all the specimens in the Museum, and cannot find a single one of *C. g. striatus* from S. India. There are, however, numerous skins of *C. terricolor malabaricus*, Jerdon, from Ooty and Coonoor on the label of one, in Mr. Oates' handwriting, is written *striatus* and I think he must have considered these birds to be *C. striatus*, when he notes that it occurs in S. India.

C.g. striatus, from Ceylon is a much smaller bird ; and as mentioned by Jerdon, has a smaller bill. *The feathers of the breast are broad in shape, and brown edged with grey, giving a mottled appearance.*

C. t. malabaricus, Jerdon, from Ooty and Coonoor, is a larger bird, with a much longer and stouter bill. *The feathers of the breast are long and narrow, and brownish in colour, with whitish triangular shaft streaks, which give the breast a streaked appearance.*

While going through the skins of "*C. canorus*," in the British Museum, I found the following specimens which are almost identical with *C.g. striatus* from Ceylon, and seem to form a connecting link between *C.g. griseus* and *C.g. striatus*. These five skins are all labelled "*C. canorus*," and are from the following localities.

♂ January, 1871, Godavery Valley ; ♂ 1-4-71, Rajamundry ; ♂ 14-1-70, S. E. Berar ; ♀ 19-3-71, Ellore (see Blanford Coll.) ; ♀ 27-4-76, Orissa (Hume Coll.)

Whether these are *C. g. striatus*, or as I think only *C.g. griseus*, or still yet another race I am unable to say, and hope that members in the above localities will collect specimens of this very common species to settle the point.

There are also in the Museum specimens of *C. g. griseus* collected by Blanford at "Godavery Valley" and "Ellore" evidently at the same time as the above, these are all typical skins of *C. g. griseus*, having the white head and dark breast, whilst the above mentioned specimens labelled "*canorus*" have the head the same colour as the back. The shape of bill, colour of wings and tail, etc., are all in these specimens from the above localities the same, and I think it most improbable that there should be two sub-species of the same race inhabiting this locality. I also consider that *C. striatus* is nothing more than a geographical race of *C. griseus* or more correctly the latter is a sub-species of the former.

Crateropus terricolor somervillii, Sykes.

The Bombay Babbler.

Timalia somervillii, Sykes, P. Z. S., 1832, p. 88.
Crateropus somervillii, Sharpe, Cat. B. M., vii., p. 482; Oates, F. B. I., i., p. 113.

Description.—As in Oates, F.B.I.
Distribution.—The Western Ghats from Tranvancore up to the Island of Bombay.

I think this is only a sub-species of *C. t. terricolor*, and most probably grades into *C. t. malabaricus*.

Crateropus rufescens, Blyth.

The Ceylon Rufous Babbler.

Malacocercus rufescens, Blyth, J. A. S. B. xvi., p. 453 (1847).
Garrulax rufescens, Sharpe, Cat. B. M., vii.
Crateropus rufescens, Oates, F. B. I., i. p. 114.
Description.—As in Oates, F. B. I.
Distribution.—The Island of Ceylon.

GROUP III.

Babax, David, 1876.

Bill gently curved, not notched, and equal, to the hind-toe and claw in length; tail considerably longer than the wing, and greatly graduated; the outer tail feather falling short of the central pair by more than the length of the tarsus; wing rounded, the first four primaries graduated, the fifth longest; sixth equal to the fourth; rictal bristles very pronounced; nostrils, oval, exposed and overhung by numerous hairs; size medium.

This small and interesting genus form a link between the true Laughing Thrushes and Babblers. They only come within Indian limits, in Tibet, and the Chin and Bhamo Hills, on the North West and N. East of Burma.

Babax lanceolatus lanceolatus, Verreaux. Inhabits Moupin, W. Szechuen, and S. China; and has been erroneously recorded from within Indian limits.

Babax l. yunnanensis, Rippon. Which is hardly separable from the last, is foumd in Yunnan and the Kachin Hills in the Bhamo District.

Babax l. bonavaloti, Ouslalet. Described from So, Tibet.

Babax koslowi koslowi, Bianchi. Tibet.

Babax k. victoriæ, Rippon. Which is very similar to the last, has at present only been recorded from the Chin hills on the west of Burma.

Babax waddelli, Dresser. From Tibet.

There are at present only a very few specimens of these species in the British Museum so that at present it is impossible to decide whether all these races really exist. The eggs of all known species are a spotless blue.

Babax lanceolatus lanceolatus, Verreaux.

The Chinese Babax.

Peterorhinus lanceolatus, T. Verr. N. Arch. Mus., Paris. VI., Bull, p. 36, 1891.
Babax lanceolatus, Sharpe, Cat. B. M., vii., p. 352.
Ianthocincla lanceolatus, Hartert, Pal. Vog., i., p. 627.
Description.—As in "Bhamo Birds," J. B. N. H. S., Vol. xix p. 113.
Distribution.—W. Szechnen, Moupin, S. Schensi, China.

The only record I can find of the occurrence of this species in India is in the J. A. S. B., Vol. lxxi., Part II., No. 111, 1902.

"Notes on a collection of birds made by Lt.-Wood, R. E., at Kampalet Mt. Victoria." When *Babax lanceolatus* is included, this must be *Babax k. victoriæ*, Rippon, which was described practically from the same locality.

Babax lanceolatus yunnanensis, Rippon.

The Yunnan Babax.

Rippon, Bull B. O. C., xii, p. 96 (1905); Harington, B. N. H. S. J. xix., p. 113 (1909), and Ibis p. 14.

Description.—Similar to *B. l. lanceolatus*, Verreaux, but the base of the bill chestnut, instead of black. I think this is a very poor sub-species.

all the specimens of *B. l. lanceolatus* I have been able to examine have the cheek stripe a very dark chestnut and not black. There are, however, some specimens of a *Babax* at Tring which seem to have a much more massive bill, these may be the true *lanceolatus* and therefore distinct from *B. l. yunannensis* I hope some one with more authority than myself will examine these birds and let us have their opinion.

Note.—The Plate of the *B. lanceolatus* in Ois. de Chin. has a dark chestnut cheek-stripe.

Distribution.—Described by Rippon from Yunnan. I obtained it and its nests at Sinlum in the Bhamo Hills where it is not uncommon. It seems to prefer the more open hill sides, which are covered with bramble bushes and bracken, and not to enter the dense secondary growth which most of the hills are covered with. Its nest is placed near the ground and of the usual rather massive babbler type. Egg 3 to 4 are a turquoise-blue and measure 1·06 × ·8 inches.

Babax lanceolatus bonavoloti, Oustalet.

Oustalet's Babax.

The Small Tibet Babax.

Babax bonavoloti.—Oustalet, Ann. Scien. Nat. Zool., Paris.: xii., p. 271, (1891).

Ianthocincla l. bonavoloti.—Hartert, Pal. Vog., i., p. 628.

Description.—" It differs from *B. E. lanceolatus*, Verreaux, from Szechuen, in having the lores and the anterior portion of the cheeks washed with darkish brown : the throat finely striped and the middle of the breast completely covered with stripes. Bill and feet darker and more powerful" —Hartert.

" Tail 183 ? ; wing 115-120 mm".

" A second specimen has the dark colouration on the lores and cheeks less pronounced. Tail 140 ; wing 110 mm." (This clearly must be a distinct sub-species from size alone).

Distribution.—So, Tibet.

This species has lately been procured by Capt. F. M. Bailey, in the Mishmi Hills, at an altitude of 10,000 feet.

Babax koslowi koslowi, Bianchi.

Bianchi's Babax.

Kaznakowia koslowi, Bianchi, Bull. Ac. Petersburgh (5), xiii., p. 45 (1905).

Ianthocincla koslowi, Hartert, Pal. Vog., i., p. 629.

Upper plumage very rufous : chin greyish, with dark shafts : otherwise very similar to *B. l. lanceolatus*.

Wing 120 m.m.; tail 150 m.m.; culmen 30 m.m.

Hab.—Tibet. Where it has been lately procured by Capt. Bailey.

Babax koslowi victoriæ, Rippon.

The Mt. Victoria Babax.

Rippon, Bul. B. O. C., xv., p. 97 (1905) ; Venning, J. B. N. H. S., xxii., p. 622 (1912).

Description.—Similar to *B. l. lanceolatus*, Verreaux, but larger cheek stripe lack. Length about 11; wing 4; tail 4·8; culmen 1·2; tarsus 1·5 (wing 100 m.m; tail 140 m.m.). I have just seen the type of *B. k. koslowi*, Bianchi, which is very similar to this bird.

Distribution.—Described by Col. Rippon from Mt. Victoria. S. Chin Hills, and procured by Capt. Venning at Haka N. Chin Hills, where he also obtained its nest and eggs. The latter are a paler blue than *B. l. yunnanensis*, and measure 1·2 × ·86 inches.

Babax waddelli, Dresser.

The Giant Tibetian Babax.

Babax waddelli.—Dresser, P.Z.S., 1905, i., p. 54 ; O. Grant, Bul. B.O.C., xv., p. 94.

Ianthocincla waddelli.—Hartert, Pal. Vog., i., p. 628.

Description.—" Upper parts dull ashy-grey, each feather with a broad central blackish stripe : the rump slightly less striped than the rest of the upper parts ; wing blackish brown, most of the feathers externally margined with ashy-grey ; tail blackish brown ; much graduated ; under parts similar to the upper parts, but somewhat paler and more narrowly striped ; bill and legs plumbeous, iris dull orange. Wing 134-142 mm : tail 165 mm ; tarsus 42 ; culmen 35-37.

Note.—This species differs from other members of this family by having a much longer and more curved bill ; and having its tail less graduated. These differences, I consider, are sufficient to give it sub-generic rank. It has the following characteristics : Bill, longer than the hind claw and toe, and much curved ; tail longer than the wing, and not greatly graduated the outer tail feather falling short of the central pair by less than the length of the tarsus : nostrils, oval, exposed and overhung by numerous hairs ; rictal bristles well developed ; size large.

Distribution.—Gyantze and Chaksam, Tibet.

Nesting.—The eggs are like all other eggs of this genus ; texture smooth, close, and fine, and the surface with a slight gloss. In shape they are long ovals but the small end is seldom much pointed. They measure about 1·26″ × 92″.

GROUP IV.

Acanthoptila, Blyth (1855).

Oates, F. B. I., i., p. 385.

Nothing appears to have been recorded of late about this genus which contains only one species. Dr. Sharpe, I think, quite rightly, placed it amongst the *Crateropodinæ*, Mr. Oates, however, considered it a Warbler. It is a very confusing bird as it appears to have two plumages which Dr. Sharpe considered to be that of the young and the old bird, whilst Mr. Oates took these two phases to denote seasonal changes and therefore placed it amongst the Warblers (*Sylviidæ*).

To me it appears to be very much more a Babbler than a Warbler, and to be intermediate between *Argya* and *Babax*. The colour of its eggs, a "verditer blue," is almost sufficient to place it amongst the *Craterapodiæ*. None of the birds in the Museum, which are all very old and worn specimens, have any dates or data of any sort, it is therefore hoped that members who may come across this species will collect a sufficient number of specimens to settle the question.

Characteristics.—Feathers of the upper plumage and breast stiff shafted which when they become worn are quite bristly ; bill fairly long and curved, not notched : nostrils long lunar shaped slits : rictal bristles weak ; wing rounded, the first four primaries graduated, the tail longer than wing, and graduated.

Acanthoptila nepalensis, Hodgson

The Spiny-Babbler.

Timalia nipalensis, Hodgson, As. Res. xix., p. 182 (1836).

Acanthoptila nipalensis, Sharpe, Cat. B. M., vii., p. 380 ; Oates, F. B. I., i. p. 386.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, and probably the Kumaon Terai, and should not be difficult to procure, so I hope any member so placed will collect a series of this interesting bird, and if possible eggs, which Hodgson records as blue, but as far as I can ascertain no authentic eggs are in any collection.

Sub-Family—Pomatorhinæ, Horsfield, 1821.

Scimitar Babblers.

Oates, F. B. I., i., p. 115.

"In this genus the bill is quite as long as the head, and frequently much longer ; it is very slender, much curved downwards and compressed. The feathers of the forehead are short, rounded and close, but feathers do not grow on the nasal membrane, which is perfectly bare. The tail is longer than the wing and considerably graduated, the outer feather being two-thirds to three quarters the length of the tail." (Oates).

All the members of this sub-family lay white unspotted eggs, which at once removes from amongst them the Australian *Pomastostomus*, which lay remarkable eggs, quite distinct from any of the *Timeliidæ*. These are a dark brown, covered all over with numerous curly lines, calling to mind the eggs of the Bronze-winged Jacana, *Metropidius indicus*. Here we have a remarkable case of development along similar lines, some of the Australian "Scimitar-Babblers" are hardly separable in appearance from the darker forms of oriental *Pomatorhini* such as *P. horsfieldi*, they have the same style of bill and plumage, and until quite recently were placed in the same genus and were only separated when the remarkable difference between the eggs of the Australian and Indian birds were taken into consideration. I may add that this is one of the many examples in which the coloration of eggs has been a great aid to classification.

The Scimitar-Babblers are very noisy birds, with loud hooting calls, as well as a very pleasing black-bird like song. They build either untidy domed nests, or very deep cups, which are always placed on or near the ground, the eggs as before mentioned are a pure white.

Key for species as in the Fauna of British India.

Pomatorhinus schisticeps—nuchalis.

The Slaty-headed Scimitar Babblers.

This group of Scimitar Babblers is noticeable in having a chestnut band on each side of the body, extending from the sides of the neck to the abdomen, is found from the N. W. Himalayas, through Nepal, Sikhim Butan, Assam to the Chin Hills, it then re-appears in the Shan States where it meets *P. olivaceus* which has not got this chestnut band on each side of the body. These two races may possibly interbreed in this locality as many specimens vary greatly in colour and size.

In *P. schisticeps* the first three sub-species have the chestnut band streaked with white, whilst the fourth, (*P. nuchalis*) has this band unstreaked.

P. s. pinwilli (Sharpe), inhabits Simla and the N. W. Himalayas, and is distinguishable by its smaller size.

P. s. schisticeps (Hodgson) extends from Nepal to Sikhim, Bhutan, Assam, and Manipur. Birds from the first three localities are noticeable for the dark colour of the chestnut band, whilst those to the east gradually get paler, until they merge into next sub-species.

P. s. mearsi (O.—Grant). Probably from Assam to the Chin Hills and Chindwin basis ; birds from these localities have the chestnut band paler on the whole, but where the range of *P. s. schisticeps* really ends and that

of *P. s. mearsi* begins is very hard to determine, the differences being so slight.

P. nuchalis (Tweeddale) inhabits the eastern side of Burma, being found in the Shan States, Karennee, and down to the Salween District of Tenasserim, and also in the Pegu and Thayetmyo Districts. There is one specimen of a *Pomatorhinus* from Popa Mt. in the Myingyan District, which, I think, is referable to this sub-species, it may possibly be distinct.

KEY.

A. Chestnut band on each side of body streaked with white.
  a^1. This band a dark maroon chestnut.
    a^2. Size small-wing under .. .. .. *P. s. pinwilli.*
    b^2. Size larger wing over .. .. .. *P. s. schisticeps.*
  b^1. Chestnut band paler .. .. .. *P. s. mearsi.*
B. Chestnut band not streaked .. .. .. *P. nuchalis.*

POMATORHINUS SCHISTICEPS SCHISTICEPS, Hodgson.

Hodgson's Slaty-headed Scimitar Babbler.

P. schistisceps, Hodgson, A. Res., xix., p. 181 (1836); Sharpe, Cat., B. M., vii., p. 411, Oates., F. B. I., i, p. 116.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Bhutan, Assam and Manipur. I have not been able to examine any specimens from Arracan, whether birds from this locality are this sub-species or *P. s. mearsi* at present cannot be determined.

Mr. Stuart-Baker informs me that he has received two specimens from Arracan, which he thinks are referable to *P. s. mearsi,* O. Grant, but that the differences are so slight, that he doubts that their being of even sub-specific value.

POMATORHINS SCHISTICEPS PINWILLI, Sharpe.

Sharpe's Slaty-headed Scimitar Babbler.

P. pinwilli, Sharpe, Cat B. M., vii., p. 413 (1883).
P. schisticeps, Oates, F. B. I., i., p. 116; O. Grant Bul. B. O., CXV., p. 39.

Description.—Similar to *P. s. schisticeps.* Hodgson, but much smaller. Mr. Oates acknowledges that Simla birds are decidedly smaller, but says the size of the wing gradually increases from 3·6 inches in the N. W. Himalayas to 4·4 inches in Arracan.

Distribution.—N. W. Himalayas.

POMATORHINUS SCHISTICEPS MEARSI, O. Grant.

Grant's Slaty-headed Scimitar Babbler.

P. mearsi, O. Grant, Bul. B. O. C., XV, p. 39 (1905).

Description.—"Most nearly allied to *P. schisticeps,* Hodgson, but the general colour above much paler. Crown ashy-brown, not sharply define from the olive-brown upper parts, but separated in some specimens by a more or less well-marked rufous collar; the rufous stripe down the sides of the neck, commencing behind the ear-coverts, is pale chestnut red instead of deep chestnut maroon." (O. Grant).

Distribution.—The western side of Burma along the foot of the Chin hills, and in the Chindwin basin. Many birds from Assam show a tendency to paleness, whilst others are as richly coloured as Nepal ones; so it is very difficult to decide the exact geographical distribution of these two closely allied sub-species.

Pomatorhinus nuchalis, Tweeddale.

Tweeddale's Scimitar Babbler.

P. nuchalis, Tweeddale, A. M. N. H. (4), xx., p. 535 (1877), Sharpe, Cat. B. M., vii., 413; Oates, F. B. I., i., p. 117; Bingham, Ibis. 1903, p. 588.

Description.—As in Oates, F. B. I.

Distribution.—Thayetmyo District, Toungoo hills and Karennee, and the Southern Shan States. Col. Bingham in the "Ibis" notes that birds from this last locality vary greatly in size and colouration.

Pomatorhinus olivaceus olivaceus, Blyth.

The Tenasserim Scimitar Babbler.

P. olivaceus, Blyth, J. A. S. B., xvi., p. 451 (1847); Sharpe, Cat. B. M., vii., p. 414; Oates, F. B. I., i., p. 118.

Description.—As in Oates, F. B. I.

Distribution.—Tenasserim.

Pomatorhinus olivaceus ripponi, Harington.

The Shan States Scimitar Babbler.

P. ripponi, Harington, Bul. B. O. C., xxvii., p. 9, 1910.

Description.—Most closely allied to *P. olivaceus*, Blyth from Tenasserim, but with the general colour of the upper parts olive-brown instead of rufous-brown; the tail similar in colour to the upper parts (in *P. olivaceus* it is much darker, blackish towards the tip and rufous towards the base); the chestnut patch on the sides of the neck somewhat paler; and the bill usually more slender. Total length about 8-3 inches; wing 3-4: tail 3-7; tarsus 0-85.

Distribution.—The Shan States, Burma.

I believe its nest and eggs have lately been taken by Captain Venning.

Pomatorhinus horsfieldi.

This sub-group has a wide range over the Peninsula of India and Ceylon, and extending to Sumatra and Java, it appears to be very subject to climatic influences, and falls into the following well-marked races:—

(i) In Rajputana, about Mt. Abu and Seoni, we have a very pale race. *P. horsfieldi obscurus* (Hume), noticeable for its very pale upper plumage and total absence of any black on the sides of the breast.

(ii) In the Deccan and extending across to Bombay, Mahableshwar, Kandalla, and Kanara, and down to the plains of Mysore and Madras, we have typical *P. horsfieldi horsfieldi* (Sykes). The original locality from which this sub-species was described, being the Deccan.

This bird is slightly darker than *P. h. obscurus* and has only faint traces of a black band on each side of the breast. Dr. Sharpe considered that Syke's types really belonged to the pale race (*P. obscurus*). They are certainly very pale, but when a large series from the above localities are taken, the differences at once become apparent. Dr. Sharpe seems to have been inclined to consider these two forms as the same, and to separate the more southern form. I consider it best to keep the two distinct, and to create another sub-species out of the Southern Indian birds, which are quite distinct from those of Mt. Abu and the Deccan.

(iii) In Travancore, the Nilghiris, at Ooty and Coonoor, and in the Pali Hills, we get a very dark, almost melannistic form, for which I propose the name of *C. horsfieldi travancoreensis* sub-sp. nov.

(iv) Ceylon is inhabited by *P. h. melanurus*, Blyth, which, I think, consists of two well-marked geographical races, which I hope will be recognised and described by Ceylon ornithologists.

Pomatorhinus horsfieldi horsfieldi, Sykes.

The Deccan Scimitar Babbler.

P. horsfieldi, Sykes, P. Z. S., 1832, p. 89, Sharpe, Cat. B. M., vii., p. 415; Oates, F. B. I., i., p. 119.

Description.—Upper plumage earthy brown, head the same colour as back; a white supercilium from the nostrils to the nape; chin, throat, breast and middle of the abdomen white, in many specimens traces of a blackish line dividing the white of the breast from the upper plumage. This sub-species is intermediate both in colour and geographical distribution, between *P. h. obscurus* and *P. h. travancoreensis* sub-sp. nov. and is more nearly allied to the former.

Distribution.—Bombay, Mahableshwar, Khandalla, Kanara, the plains of Mysore, Madras, and the Deccan.

Pomatorhinus horsfieldi obscurus, Hume.

Hume's Scimitar Babbler.

P. obscurus, Hume, S. F., i., p. 7 (1873); Sharpe, Cat. B. M., vii., p. 416; Oates, F. B. I., i., p. 120.

Description.—As in Oates, F. B. I.

This sub-species is distinguishable by a total want of a black band separating the white of the breast from the upper plumage.

Distribution.—Mt. Abu and Seoni. More specimens are required to decide the exact range of this sub-species, especially to the North and East.

Pomatorhinus horsfieldi travancoreensis, Sub-sp. nov.

The Southern Indian Scimitar Babbler.

Description.—Upper plumage a rich olive-brown; head decidedly darker and with numerous black feathers; the tail in many specimens being black at the end; a conspicuous white supercilium from the nostrils to the nape; a line below the supercilium, cheeks, ear-coverts and a band continued down the sides of the breast, and encircling it black, many of the feathers having white streaks: chin, throat, breast and centre of abdomen white, flanks and sides of the body greyish brown.

Some specimens from Travancore, Ooty and Coonoor, are very black on the heads and tails.

Type in the British Museum from Peermall, Travancore. S. India. Surgeon-Major W. Fry., Coll.

Distribution.—Travancore, the Nilghiri and Palni Hills.

Pomatorhinus horsfieldi melanurus, Blyth.

The Ceylon Scimitar Babbler.

Pomatorhinus melanurus, Blyth, J.A.S.B., xvi., p. 451 (1847); Sharpe Cat. B. M., vii., p. 414; Oates, F. B. I., i., p. 118; Wardlaw-Ramsay, Ibis 1878, p. 132.

Description.—As in Oates, F. B. I.

Both Sharpe and Wardlaw-Ramsay point out the differences between birds from the dry and wet zones of Ceylon. Sharpe quotes Legge, who says that there is a complete "gradation between the most ferruginous birds, which come from the damp districts of the south, where climate and heat are combined, to that of the hill birds from the upper zone is very perfect, a complete sequence being obtainable on going up through the "Wilderness of the Peak" from the lowlying portions of Saffragam to the Horton Plains.'

To me there appear to be two distinct sub-species, one a rich rufous olive-brown, and the other plain olive, and I hope some one better acquainted with the birds of Ceylon will name and describe them. Between sub-species there must always be connecting links, and no doubt in a confined area like Ceylon, these links are more noticeable and easily procurable, but this is no reason why the birds at the two extremities of the chain should not be held sub-specifically distinct.

Pomatorhinus ferruginosus.

The Coral-billed Scimitar Babblers.

This race consists of two nearly allied sub-species.

P. f. ferruginosus, Blyths, having the under parts a dark rich rusty-red, and the crown of the head black.

P. f. phayrei, Blyth, having the under parts paler, and the top of the head, the same colour as the back.

Pomatorhinus ferruginosus ferruginosus, Blyth.

The Nepal Coral-billed Scimitar Babbler.

Pomatorhinus ferruginosus, Blyth, J. A. S. B., xiv., p. 597 (1845); Sharpe, Cat. B.M., vii., p. 422; Oates, F. B. I., i., p. 120.

Description.—As in Oates, F. B. I.

Distribution.—From Nepal to the Datla Hills in Assam.

Pomatorhinus ferruginosus phayrei, Blyth.

Phayre's Scimitar Babbler.

Pomatorhinus phayrei, Blyth, J.A.S.B., xvi., p. 452 (1847); Sharpe Cat. B. M., vii. p. 422; Oates, F. B. I., i., p. 121.

Description.—As in Oates, F. B. I.

Distribution.—Shillong in the Khasia Hills to Manipur, and Naga and Chin Hills (Mt. Victoria).

Birds from this last locality have the upper plumage tinged with green much more than the typical Assam birds, and the under parts paler.

Pomatorhinus albigularis.

These are birds very nearly allied to *P. ferruginosus* and might be almost considered a race of that species. I, however, have kept them separate as the under parts are so very much paler. *P. a. albigularis*, Blyth, has the chin and throat white, and under parts tinged with faint rufous and is found in the hills of Tenasserim.

P. a. mariæ, Walden, has the under parts pale buff, with no tinge of rufous and is found in the hills east of Toungoo, Kareunee and on Byingyi mountain.

Pomatorhinus albigularis albigularis, Blyth.

Blyth's Scimitar Babbler.

Pomatorhinus albigularis, Blyth, J. A. S. B., xxiv., p. 274 (1855); Sharpe, Cat. B. M., vii., p. 423; Oates, F. B. I., i., p. 121.

Description.—As in Oates F. B. I.

Distribution.—The mountain ranges of Tenasserim down to Tavoy.

Pomatorhinus albigularis mariæ, Walden.

Walden's Scimitar Babbler.

Pomatorhinus mariæ, Walden, A. M. N. H. (4), xv., p. 403 (1875).

Description.—Similar to *P. a. albigularis*, Blyth, from Tenasserim, but paler, the under parts being a pale buff with no tinge of rufous.

Distribution. Toungoo and Karen Hills, also Byingyi Mt., Yemathin District, Upper Burma, where it was procured by Mr Oates.

Pomatorhinus ruficollis, Group.

The Rufous-necked Scimitar Babblers.

Godwin-Austin, J. A. S. B., xliii., Pt. ii., p. 160 and xlv., Pt. ii., p. 75 : Wardlaw-Ramsay, Ibis, 1878, p. 138 ; Seebohm, Ibis, 1884, p. 129.

This group consists of the smallest Scimitar-Babblers, and has a very extensive range, from Nepal to China ; and falls into four well-marked geographical races.

Both Seebohm and Wardlaw-Ramsay draw attention to the difference between birds from China, and those from the Himalayas, but neither mention the chief difference. Birds from Nepal to Yunnan have rather a long curved bill, both the culmen and the lower edge of the lower mandible being curved, whilst birds from China proper have a shorter and stouter bill, the culmen only being curved and the lower edge of the lower mandible being almost straight.

Godwin-Austin also draws attention to the difference between the birds from the Dafla Hills in Assam, to those from other parts of the province. This is quite natural, the boundary being the Bramaputra River birds to the North, *i. e.*, from Nepal, Sikhim, Butan and the Dafla hills are identical and typical, *P. ruficollis ruficollis*, Hodgson.

Birds, south of the Bramaputra from Khasia hills, Manipur, Naga and Chin Hills, and Western Yunnan and the Bhamo hills, are paler and more olive above, and instead of being a distinct brown and white below, are fulvous and white ; and less richly coloured than those from the Himalayas, the bill also is more slender than in *P. r. ruficollis*. As birds from this locality have not been described, I propose the name *P. ruficollis bakeri*, Sub sp. nov. after Mr. E. C. Stuart Baker.

In China we have *P. ruficollis stridulus*, Swinhoe, from Szechuen and Fokien.

And *P. ruficollis styani*, Seebohm, from the Yangtze Valley, China.

Key.

A. Bill average about 20 m.m. (the exposed portion of culmen to tip) gonys curved.
  a. Upper Plumage Ruddy-brown, Lower plumage, brown and white. *P. r. ruficollis.*
  b. Upper Plumage Olive-brown, Lower plumage olive-fulvous and white *P. r. bakeri.*

B. Bill average about 16 mm., gonys straight.
  c. Rich ruddy brown above, chestnut brown and white below. *P. s. stridulus.*
  d. Pale ruddy-brown above, olive-brown and white below. *P. s. styani*

Pomatorhinus ruficollis ruficollis, Hodgson.

The Nepal rufous-necked Scimitar Babbler.

P. ruficollis, Hodgson, as Res., xix., p. 182 (1836) ; Sharpe, Cat. B.M., vii., p. 426 ; Oates, F.B.I., i., p. 122.

Description.—As in Oates, F.B.I.

Birds from Nepal to the Dafla hills have, as stated by Godwin-Austin, rather stouter feet and legs, and are much richer and redder in colouring and darker birds.

Average wing measurement 10 Nepal birds 80·1 m.m.
" " " 10 Sikhim " 81·4 " "
" " " 10 Bhutan & Dafla " 82·0 " "
and bills 20 m.m.

Distribution.—Nepal, Sikhim, Butan and Dafla Hills.

In the British Museum there are two specimens collected by the late A. Anderson from the N. W. Himalayas, these are decidedly smaller and more rufous below than Nepal birds, and have a wing measurement of 77-78 m.m.; and bills of 17. m.m. (And may possibly be young birds.).

More specimens are required, as it is quite possible that there is a race of small *P. ruficollis* in the Western Himalayas.

Pomatorhinus ruficollis bakeri,* subs. nov.

Baker's rufous-necked Scimitar Babbler.

Description.—Similar to *P. r. ruficollis*, Hodgson, from Nepal differs in being much paler and more olive-brown; and instead of being a distinct olive-brown and white below, are fulvous and white; and are not so richly coloured; also have a more slender bill than the northern race.

Types in British Museum No. 400 and No. 86, 10.1.3610 Shillong. Nov. 1877, J. Cockburn, Coll.

Distribution.—Assam from the Khasia Hills to the Naga Hills and Manipur, the Chin Hills on the West, and the Bhamo Hills on the N. E. of Burma, also Western Yunnan.

Note.—There are three specimens in the Museum collected by Capt. Wingate from Southern Yunnan, these have no signs of streaks on the breast, but are otherwise like *P. r. bakeri*, and may constitute another sub-species.

Pomatorhinus ochraceiceps.

The Slender-billed Scimitar Babblers.

The following Scimitar-Babblers are remarkable for their very long slender curved bills. Their range, as at present known, extends from Assam to Manipur; and the Southern Shan States to Karennee and Tenasserim.

Pomatorhinus ochraceiceps ochraceiceps, Walden.

Lloyd's Scimitar Babbler.

Walden, A.M.N.H. (4), xii. p. 487, 1873; Sharpe, Cat. B.M.,vii., p. 417; Oates, F.B.I., i., p. 123.

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* Pomatorhinus ruficollis stridulus, Swinhoe.

P. stridulus, Swinhoe, *Ibis* 1861, p. 265.

Very similar to *P. r. ruficollis*, Hodgson, but has a smaller and stouter bill: more highly coloured, being above, a very rich rufous almost cinnamon-brown, below a rich chestnut brown with white striations.

Bill about 16 m.m. and wing 78 m.m.

Distribution—Szechuen and Fokhien, China.

Pomatorhinus ruficollis styani, Seebhom.

Seebohm, *Ibis*, 1884, p. 263.

Differs from *P. r. stridulus*, Swinhoe, in being much paler above and below; although being much darker and richer than the longer-billed forms, *P. r. ruficollis* and *P. r. bakeri*.

Distribution.—Yangtze Valley, China.

Description.—As in Oates, F.B.I.

Distribution.—Byingyi Mountain; Wa-Noi, the Southern Shan States, Karennee and Tenasserim.

Nothing appears to be known about the nidifection of this species.

Pomatorhinus ochraceiceps austeni, Hume.

Hume's Scimitar Babbler.

Hume, S. F., x:, p. 152 (1881); Sharpe, Cat. B. M., vii., p. 418 : Oates, F. B. I., i., p. 123; Baker, Ibis, 1906, p. 93.

Description.—As in Oates.

Distribution.—Mr. Stuart Baker says "The distribution of these two forms (*P. o. austeni and stenorhynchus*) is rather curious, in N. Cachar, I procured birds which were intermediate in every way."

Nesting.—According to Mr. Stuart Baker, it builds a deep cupshaped type of nest, and lays from 3 to 5, pure white, eggs; these are slightly glossy, and fragile for their size; and measure between ·89″ and ·93″ in length, and ·63″ and ·69″ in breadth.

Pomatorhinus ochraceiceps stenorhynchus, Godwin-Austin.

Austin's Scimitar Babbler.

Godwin-Austin, J. A. S. B., xlvi., p. ii., p. 43 (1877); Sharpe, Cat. B. M., vii., p. 424; Oates, F. B. I., i., p. 124; Baker, Ibis, 1909, p. 94.

Description.—As in Oates, F. B. I.

Distribution.—Sadiya in Assam.

Nesting.—Stuart Baker, says this species is extremely rare in North Cachar. The majority of his specimens were got on lofty ridges of 6,000ft. In the Lakhimpur District it occurs at a much lower elevations, at about 4,000 ft. The nest and eggs are similar to those of *P. o. stenorhynchus*. The eggs, however, are much larger, and measure between 96″ and 1·13 in length and between ·67″ and ·72″ in breadth. The bird appears to lay from March to May.

Pomatorhinus erythrogenys.

The Rufous-cheeked Scimitar Babblers.

In this nearly allied sub-group of the Scimitar Babbler we get a more plain coloured bird, olive-brown above, and under parts white, either plain or streaked. They have a much coarser bill than the preceding species, and were given a genus (*Orthorhinus*) to themselves by Blyth.

They are all very nearly allied when compared, but those nearest in appearance are furthest apart geographically. They extend from the N.-W. Himalayas through Assam to Burma and Yunnan, and down to Tenasserim.

Commencing from the extreme N.-W. we have :

P. e. erthrogenys, Vigors. In the N.-W. Himalayas, this is noticeable for having its breast almost pure white, with only faint indications of grey stripes; and its flanks deep rufous.

P. e. haringtoni, Baker. From Nepal and Sikhim, in this latter subspecies the breast is pale ashy-grey, streaked with white and flanks deep rufous.

P. e. macclellandi, Jerdon. From Assam and the Chin Hills, has the flank olivaceous; the breast white, streaked with dark ashy-brown.

P. e. gravivor, David. From Yunnan and the Bhamo Hills, is very like the last but has flanks rufous, and the breast streaked with black.

P. e. imberbis, Salvadori. Down the Eastern side of Burma from the Ruby Mines District through the Shan States and Karennee to Tenasserim; this bird is almost identical with the N.-W. Himalayan birds, only differing in being smaller. This is a very interesting point in evolution, and we have the same phenomena (the tendency that the two extremes of a race have in being much nearer in appearance to each other than to the intervening races) in many other species in different genera—such as in *Alcippe*. *A. p. brucei*, Hume, from Western India, is almost identical with *A. p. phayrei*, Blyth, from Tenasserim, although intervening, we have other sub-species. *Pellorneum ruficeps ruficeps*, from S. India being nearer to *P. r. subochraceum* from Lower Burma, than to *P. r. mandellii* or *P. r. minus* which intervene. The Burmese Bush-Larks, Quails and Green Pigeons, etc., being in some species hardly separable from Madras birds. Many other cases of similarity between sub-species from the two extremities of the geographical range of a species could be given, pointing out that given the same conditions, two races will probably develop along similar lines.

Pomatorhinus erythrogenys erythrogenys, Vigors.

Vigor's Rusty-cheeked Scimitar Babbler.

Pomatorhinus erythrogenys, Vigors, P.Z.S., 1831, p. 173; Sharpe, Cat. B. M. vii., p. 430; Oates, F. B. I., i., p. 124.

Description.—As in Oates, F. B. I.

Distribution.—N.-W. Himalayas, Rawal Pindi to Simla, these birds show very little trace of grey streakings on the breast.

Pomatorhinus erythrogenys haringtoni, Baker.

Baker's Rufous-cheeked Scimitar Babbler.

S. Baker. Bul. B O. C. xxxiii, p. 123, 1914.

Description.—The whole chin, throat, and upper breast dark ashy-brown, the feathers having merely whitish bases on the chin and throat, and white centres on the breast. The upper parts are also somewhat darker and less rufescent in the eastern than in the western form.

Distribution.—Himalayas east from Sikhim.

Pomatorhinus erythrogenys macclellandi, Jerdon.

MacClelland's Scimitar Babbler.

Pomatorhinus macclellandi, Jerdon, B. I., ii., p. 32 (1863); Sharpe, Cat. B. M., vii., p. 431; Oates, F. B. I., i., p. 125.

Description.—As in Oates.

Distribution.—Assam, south of the Bramaputra. Khasia hills, Naga hills, Manipur and the Chin hills.

Pomatorhinus erythrogenys imberbis, Salvadori.

Salvadori's Scimitar Babbler.

P. imberbis, Salvadori, Mus. Civ. st. Nat. Genova (2), vii., p. 410 (1889). Oates, F. B. I., i., p. 125. (Footnote): Blanford, F. B. I., iv., App. 479.

Almost identical in colouration with *P. e. erythrogenys*, from N.-W. Himalayas, differs in size.

Length about 9·25: tail 3·4; wing 3·4; tarsus 1·45; culmen 1·2 inches.

Distribution.—In the hills down the eastern side of Burma, from the Ruby Mines District, through the Shan States and Karannee, to Tenasserim. One or two specimens in the British Museum, show indications of grey stripes on the breast, and are probably intermediate between this sub-species and *P. e. gravivox*.

Pomatorhinus erythrogenys gravivox,* David.

David's Scimitar Babbler.

P. gravivox, David, Ann. Sci. Nat., xviii., art. v., p. 2 (1873), Hartert. Pal. Vog., i., 638; Harington, B. N. H. S. J., xix., p. 115.

Very similar to *P. e. macclellandi*, Jerdon, from Assam differs in having its upper plumage of a more greenish tinge, and the stripes on the throat black instead of grey; the sides of the body and flanks a rich chestnut instead of olive-brown.

Distribution.—The Bhamo hills, Yunnan, Schensi, and Kansu, China.

Nesting.—I found this bird fairly plentiful in the Bhamo Hills, and procured its nest, this is an untidy dome-shaped structure placed on the ground, the eggs measuring 1·07 × ·87 inches.

Pomatorinus hypoleucus.

The Giant Scimitar Babblers.

These three nearly allied forms are giants amongst the Scimitar-Babblers and almost constitute a genus by themselves.

Their range at present is not satisfactorily known, but probably extends from Assam down both sides of the Chin Hills; and from Tenasserim down the Malay Peninsula.

Three closely allied forms are known.

P. h. hypoleucus, Blyth. From Assam and Manipur and Arracan. *P. h. tickellii*, Blyth., Tenasserim, *P. h. wrayi*, Sharpe, Perak Mountains, Malay Peninsula.

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* *A very nearly allied sub-species.*

P. g. dedekensi, Oustalet (1893); Oustalet, Ann. Sc. Nat. Zool. ser. 7, xii., p. 276; Hartert, Pal. Vog., i, p. 638.

Hab.—Occurs in Szechuen and Tibet.

Pomatorhinus (Drymocataphus) rubiginosus, Walden.

Trichostoma rubiginosa, Walden, A.M.N.H. (4), xv., p. 402 (1875).

Drymocataphus rubiginosus, Sharpe, Cat. B. M., ii. v., p. 5600; Oates, F.B.I., i., p. 145.

Pomatorhinus rubiginosus, Harington, Bul., B.O.C., xxxiii., p. 46 (1913).

"The only examples of this so-called species are two from Karennee, both in the British Museum. These are quite young birds, and are very similar to young examples of *Pomatorhinus imberbis*, Salvadori, a species which also first described from Karennee, and of which there are now numerous specimens in the British Museum from the Shan States, Burma."

"The immature types of *P. rubiginosus*, differ from specimens of *P. imberbis* of a similar age in having the upper parts much browner and the breast and flanks dull chestnut instead of rusty red."

"The adult of *P. rubiginosus* still remains to be discovered." (Harington).

On re-examining these two specimens and comparing them with the young of *P. erythrogenys*, I find that they agree in colour with the only specimen of the young of that species available, but both, the specimens of *P. rubiginosus*, Walden, and the young bird of *P. erythrogenys*, differ in the same way from the adults of these two species, which are so similar in coloration, in having a much more rufous tinge to their upper and lower plumage, which I think must be caused by chemical action. It is most improbable that there should be nearly allied undescribed sub-species of Scimitar-Babbler in the Karennee Hills, from which locality there are numerous specimens now available of *P. imberbis*.

I therefore consider these two specimens to be merely the young *P. e. imberbis*, Salvadori.

As the name *rubiginosus*, Blyth, is a synonym of *P. f. ferruginosus*, Blyth, Walden's name, therefore, could not stand in any case.

POMATORHINUS HYPOLEUCUS HYPOLEUCUS, Blyth.

The Arracan Scimitar Babbler.

Orthorhinus hypoleucus, Blyth, J. A. S. B., xiii., p. 371 (1844.)

Pomatorhinus hypoleucus, Sharpe, Cat. B. M., vii., p. 428; Oates, F.B.I., i., p. 126, Baker, Ibis 1906, p. 95.

Description.—As in Oates, F.B.I.

Distribution.—As in Oates. And also the Chindwin basin, I have not been able to examine any specimens from Arracan where the type originally came from, nor the Chindwin area, where I believe it has been got breeding by Mr. C. Hopwood.

Nesting.—Stuart Baker says that this bird builds the usual type of nest: either domed or a deep cup, and that the eggs are white, and in shape broad blunt oval, and range in size between 1·23″ and 1·20″ in length and ·87″ and ·83″ in breadth.

POMATORHINUS HYPOLEUCUS TICKELLI,* Blyth.

Tickell's Giant Scimitar Babbler.

Blyth, J. A. S. B., xxiv., p. 273 (1875); Sharpe, Cat. B. M., vii., p. 429; Oates, F. B. I., i., p. 127.

Description and *Distribution.*—As in Oates, F. B. I.

"[Nests and eggs do not differ from that of *P. h. hypoleucus*. Four in my collection measure between 1·16″ and 1·18″ in length and ·96 in breadth."—E.C.S.B.]

XIPHORHAMPHUS, Blyth (1843).

"This genus merely differ from *Pomatorhinus* by its excessively long and still more narrow bill. Only one species is known."—(Oates).

XIPHORHAMPHUS SUPERCILIARIS, Blyth.

Blyth, J. A. S. B., xi., p. 175 (1842); Sharpe, Cat. B. M., vii., 433; Oates, F. B. I., i., p. 128.

Description.—As in Oates, F. B. I.

I have only been able to examine one specimen from Manipur, procured by Godwin-Austin on the Konchungbum Peak, this has the breast much paler, and not rufous, and most probably constitutes a distinct subspecies.

Nesting.—"The nest of this bird—is that of all the Scimitar Babblers. It is made principally of grass and dead leaves, with a few bamboo leaves where such are obtainable, and is either completely domed or semi-domed, or very deep cup shaped, and placed on one side so that it appears to be domed if casually examined. As a rule it is placed actually on the ground in amongst bracken, ferns, or scrub jungle in forests and occasionally I have taken it two or three feet up in thick bushes or in tangles of jasmines, raspberries, etc."

The eggs from 2 to 4 in number are, of course, white, and of much the same shape and texture, as the eggs of the smaller *Pomatorihinus*. They average about ·96″×·72″.—E. C. S. B.

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* Pomatorhinus hypoleucus wrayi, Sharpe.

Sharpe, P. Z. S., 1887, p. 437.

Very similar to *P. h. tickelli*, Blyth differs in being much darker; the head dusky brown, inclining to dark ashy; the tail black instead of rufous-brown.

Hab.—The mountains of Perak, Malay Peninsula.

(*To be continued.*)

PROGRESS OF THE MAMMAL SURVEY.

When the last report was published at the end of May our Collector Mr. C. A. Crump was in the Hazaribagh District of the Province of Behar and Orissa. From thence he moved to Chaibassa which is in Singbhoom, and though at first the persistent rain was against his obtaining a good collection, fortunately, some breaks in the weather enabled him to do well and he has managed to get quite a representative collection together. Mr. Crump, his assistant and servants all suffered a good deal from malaria which retarded work considerably. From Chaibassa he proceeded to Calcutta both for a few days holiday and also to try and obtain some bats, &c., which are found there. Mr. E. G. Laird-MacGregor, I.C.S., was good enough to help him with advice and facilities for collecting whilst in Calcutta. After a week or two in Calcutta Mr. Crump proceeded to Midnapur for a camp to obtain a few animals which were particularly required, namely, hares, langur monkeys and porcupines. Our plans were then that he should go to Orissa and after that to Southern India, but owing to the desirability of working the Nepal East Frontier, Darjeeling and a part of Sikkim at an early date and also to the fact that Mr. Crump has had so much malaria, it was decided to send him up there towards the end of September.

He is now in Sikkim, where through the kind assistance of H. E. Lord Carmichael, permission was obtained from H. H. The Maharaja of Sikkim to collect mammals in that State.

Mr. Shortridge and Capt. Macmillan arrived at Rangoon in May from the Tenasserim Coast and left by river for Monywa and Kindat in Upper Chindwin, where members and others have kindly given them assistance. From Kindat as the rains were not very heavy they took the opportunity of the river being in flood to go up to Homalin. The squirrels are of much interest in this part of Upper Burma and Mr. Shortridge in a recent letter remarked on the curious fact that whilst on the one side of the Chin River one species was found on the other side quite a different variety occurred. Mr. Shortridge and Capt. Macmillan hope to get down to Pegu and Shwegyin at the close of the rains and then to leave for Assam and the Khasia Hills whence collection are urgently needed to enable the Upper Burma species to be worked out.

As there is still a large part of Burma to be worked, it is hoped that they will be able to return there after Assam if money is forthcoming to enable the Survey to continue.

Major Mayor, the third Collector, arrived from Ceylon in June and proceeded to Gwalior, Central India, in July where H. H. the Maharaja Scindia had kindly made all arrangements for his collecting tour.

Unfortunately, when War in Europe broke out, Major Mayor being on the Army Reserve had to rejoin at once and therefore proceeded home by the mail steamer of the 15th August.

Since the above was in type Mr. Shortridge and Capt. MacMillan have returned to Bombay on their way to the front. Before leaving they exhibited their specimens at a meeting of the Society and the fine series of different squirrels created much interest. It is to be hoped that they will return when the War is over to help in completing the survey.

The accompanying Map will enable members to see at a glance how much the Survey has done and also how much still remains to be done.

MAMMAL FUND.

FURTHER LIST OF SUBSCRIPTIONS UP TO 31st OCTOBER 1914.

Names.			Amount.		
			Rs.	a.	p.
Amount previously acknowledged in Journal No. 1, Vol. XXIII			82,762	10	7
Burd, Capt. E.			20	0	0
Capper, Major A. Stewart			15	0	0
Delme-Radcliffe, Capt. A.			15	0	0
Government of Central Provinces (2nd Donation) ..			2,500	0	0
Hannyngton, F. (I.C.S.)			20	0	0
Logan, Capt. R. O.			8	12	0
Lister, R. S.			15	0	0
McNeill, J. (I.C.S.)			50	0	0
O'Donel, H. V.			10	0	0
The Royal Society, London (2nd Donation £10) ..			150	0	0
Suter, Dr. M. F.			40	0	0
Wall, Major F. (I.M.S.)			10	8	0
Ware, F. (C.V.D.)			10	0	0
Young, E. H.			15	0	0
			85,641	14	7
Interest Credited by Bank on Current Account up to 31st October 1914	Rs.	363-11-6			
Do. B. P. T. Bonds up to 31st October 1914.	,,	282-3-0			
Do. Fixed Deposits up to 31st October 1914.	,,	1,176-15-5			
			1,822	13	11
Promised.					
Government of Bihar and Orissa			1,500	0	0
		Total Rs.	88,964	12	6

The subscriptions to the Mammal Survey Fuud up to date amounts to Rs. 85,641-14-7 added to which we have Rs. 1,822-13-11 for interest earned and Rs. 1,500 promised making a total of Rs. 88,964-12-6. The expenditure up to date amounts to Rs. 73,002-4-1 leaving a balance in hand of Rs. 15,962-8-5.

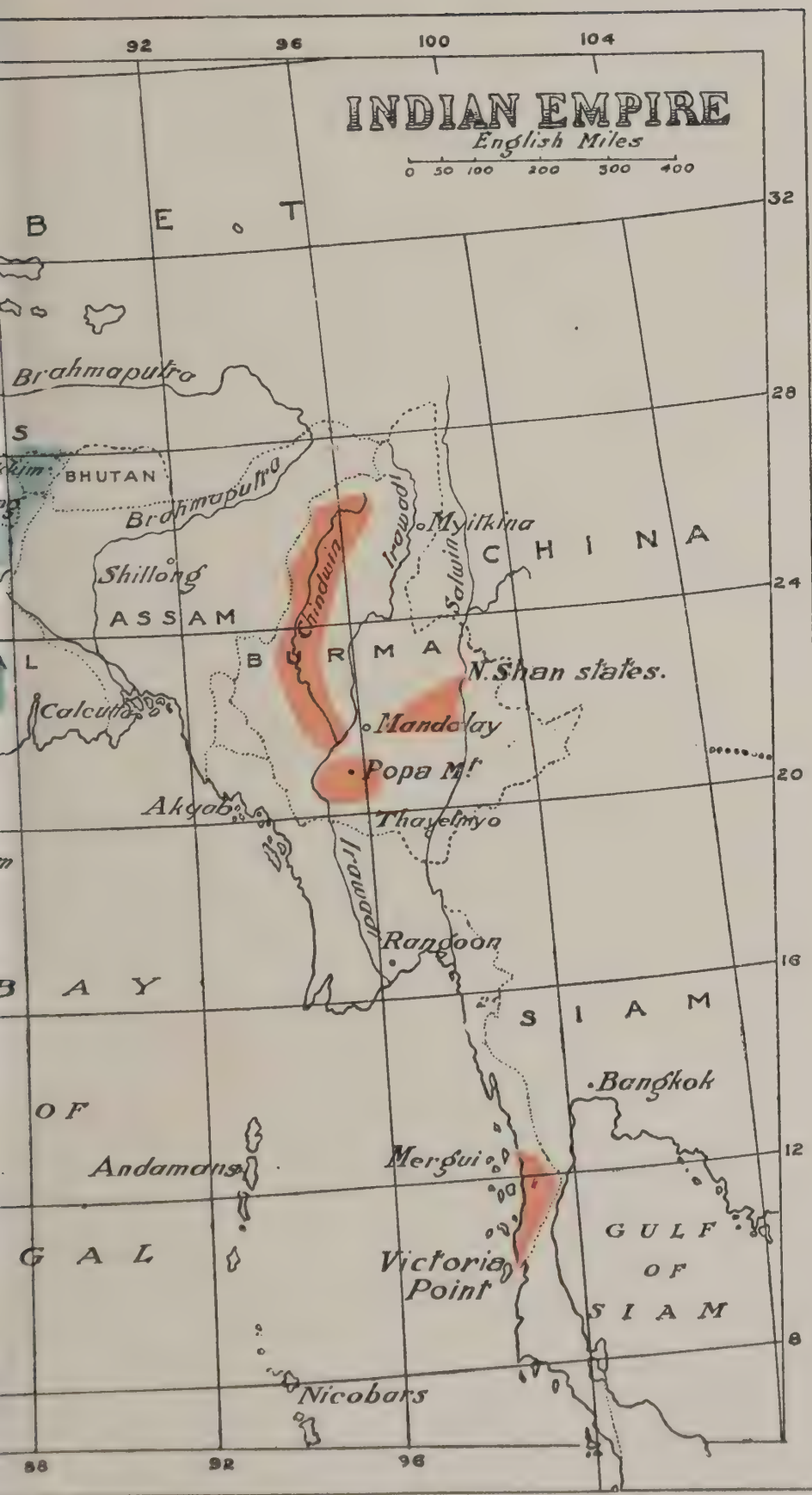
Map showing the Districts worked and

The whole colours represent districts finished

Blue Mr. C. A. Crump. *Red* Mr. G. C. Shortridge

a, & Ceylon.

eing worked by the Collectors.



reas where the Collectors are at present.

A. Macmillan. Yellow *Major E. W. Mayor.*

MISCELLANEOUS NOTES.

No. I.—BLACK TIGERS (*FELIS TIGRIS*).

With reference to Miscellaneous Note No. II in the Journal of the Society, Vol. XXII, No. 4, I also believe that I once saw a black tiger. In the autumn of 1895 I was shooting in company with Mr. C. J. Maltby, now of Harrow-on-the Hill, in the Cardamon Hills of Travancore. I had shot a bison rather late in the day on a high hill which lay full in view of our camp. Being unable to do any skinning before dark we left the carcase and the next morning sent out some hill men to bring in the head. I was watching their progress through a field glass when I observed a large black animal basking on a piece of rock; I drew my companion's attention to it; he fetched his telescope and almost at once handed it to me with the remark that the animal was a black tiger; I myself had already come to the same conclusion and further observation through the telescope confirmed me in my opinion. We could now see the hill men suddenly stop as if they too had observed the animal; the men ultimately continued their advance by another route and the animal no doubt observing them, got up and went away. When questioned on their return to camp the hill men stated that they had seen a tiger and that it had been feeding on the bison. Very heavy rain came on that night and when we were able to visit the spot no foot-prints could be seen.

I may mention that black panthers are not extremely rare in the jungles of Travancore.

STEWART CAPPER, Major.

Agar, 21*st July* 1912.

No. II.—PANTHER KEPT FROM KILL BY PARIAH DOGS.

Last season when camped at Rojam, a village in Dohad Taluka of this District, on January 6th I was informed in the morning that a panther had killed a cow near a Bhil's house about a mile away. I went at once to the spot and found the dead animal, partially eaten, lying in the open, about 100 yards away from the house. The Bhils in those parts do not live in villages but in separate houses scattered about at short distances over the country-side.

I had the carcass dragged along the ground to a suitable tree about 50 yards away from the house and a machan built in the tree.

I returned in the afternoon and sat up for the panther. Soon after I got into the machan two ordinary pariah-dogs came out from the house and started feeding on the dead cow.

As it got dark, there was no moon, the panther arrived, went to the original spot where he had left the cow and from there followed up the trail of the carcass and saw it and the dogs under the tree.

Instead of going on to the kill he lay down to one side about 30 yards away growling at the dogs. I was then surprised to see that the dogs, evidently annoyed at being disturbed in their meal did not appear to be afraid of the panther but stood just by the kill barking furiously. This performance went on for an hour or so, the dogs not giving way an inch, and would have contained longer but my Shikari, from the house, called the dogs off.

Then after waiting a good long time, the panther came slowly on to the kill. It was quite dark, I turned on the light and fired, he rushed off but was found dead next morning on the edge of the forest about ½ mile away.

D. BOURKE, I.F.S.

Godhra, Panch Mahals, *July* 31*st*, 1914.

No. III.—A RECORD PANTHER.

I send a photo of a panther shot by Alec Murray, Indian Police, in this district last year (or rather of its skin as this is the only photo Mr. Murray was able to get) which will I think interest you. The animal measured before skinning 8′ 7½″ measured straight between pegs fixed at tip of nose and tip of tail and as far as Mr. Murray has been able to find out this is an absolute record. It was shot at Khara, Banda Tahsil, Banda District, U. P., in April 1913.

On the back of the photo is an outline of the 'lucky bone' of this panther. This bone measures 2$\frac{13}{16}$″ round the outer curve.

I shall be glad to know if the size is a record and to have the photo back after you have made any use you like of it.

D. R. H. BROWNE,
Executive Engineer, P. W. D.

BANDA, U. P., 23*rd June* 1914.

[The photograph is not reproduced as it was only the photograph of the skin and not of the panther. 8′ 7½″ measured straight certainly seems to be a record. It is a pity Mr. Murray did not take separate measurements also of the head and body and the tail.—EDS.]

No. IV.—THE ATTITUDES AND MOVEMENTS OF THE LARGE RED FLYING-SQUIRREL—*PETAURISTA INORNATUS.*

BY R. W. G. HINGSTON, I.M.S.

(*With a plate.*)

If we cast a glance over the world of animated Nature we see all living creatures adapted most beautifully to the varied conditions of their existence. But the most strange and wondrous of all these adaptations, and those which most powerfully excite our interest, are the various modifications by which a small group of any great class of animals becomes fitted for a sphere of life different from that which the great majority of its members enjoy. Strange is the structure of those wild sea-birds which live in equal happiness floating upon the surface of the ocean, chasing their fishy prey in the depths beneath, soaring in the air above or peacefully resting on the rocky shore. We wonder not at that host of mammals which live but on the surface of the earth, that part of the economy of Nature for which they seem to have been definitely created, but when we see great groups of them wandering into the domains of other creatures, into the air or into the sea, we cannot but believe that they are abberant branches of the great ancestral stock that once occupied the land, and we stand amazed at the beauty of the adaptations with which Nature has fitted them for their anomalous existence. The mighty Cetaceans of the ocean are more astonishing than the greatest Pachyderms of the land, the bat, which lives a bird-like life in the air, is more surprising than any mammal that walks upon the earth; and when we see a rodent adapted for movement on the solid ground, for climbing up the trunks and along the branches of the trees and for a beautiful gliding motion through the thin air, we are filled with admiration at the manner in which Nature has formed such a creature for the different spheres in which it dwells. The Flying Squirrel lives this three-fold life, on the ground, in the tree-top and through the air.

On the ground (Fig. 1).

Though the solid earth must not be considered as the main centre of activity in which this species lives, yet it is well adapted for movement on

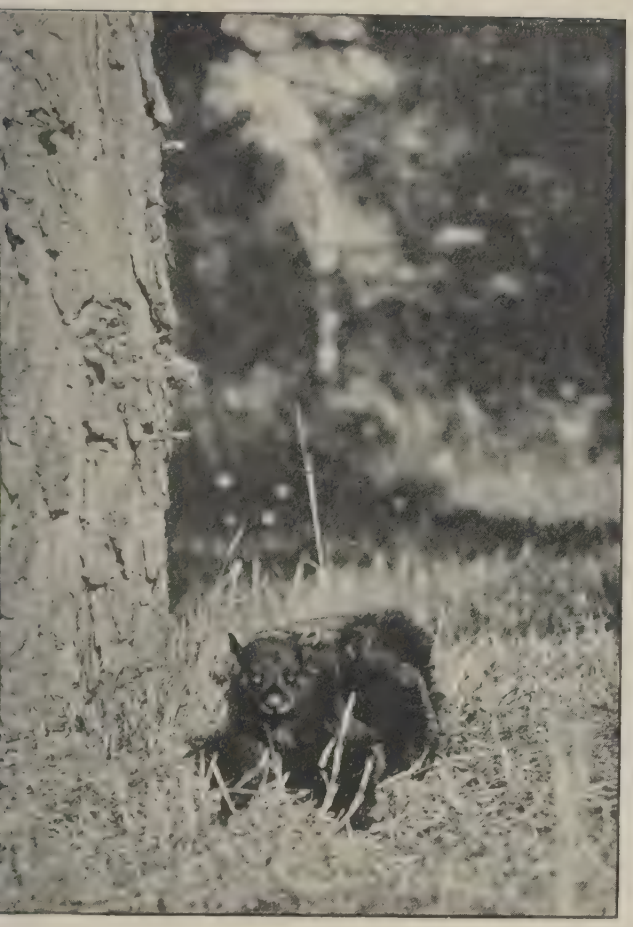


FIG. 1. On the ground.

FIG. 2. In the tree.

FIG. 3. Through the air.

THE LARGE RED FLYING-SQUIRREL (*Petaurista inornatus*).

its surface. It advances in a continuous succession of short leaps, the length and frequency of which vary in accordance with the pace at which it moves. The average length of each leap is about twelve inches, and the whole movement is one of sinuous regularity though occasionally a walking gait is assumed. The pliant body is at each leap flexed and the back is arched; the head is raised from off the ground, the eyes are widely opened the body is propelled forward by a forcible contraction of the hind limbs and gently alights on all fours at the termination of each bound. The claws are elevated by an extension of the toes and this permits the animal to rest on the soft pads of the feet and prevents the claws from penetrating the soil and impeding its further progress. During slow motion the tail is often elevated and curled over the back, thus displaying the white subcaudal spot which makes the creature almost as conspicuous as the white tail makes the rabbit when hastening to its burrow. But during any rapid progression the long bushy tail is immediately lowered, prolonged out behind, rigidly fixed and but very slightly elevated above the surface of the body. The beautiful manner in which the parachute is folded beneath the body, when not in use, renders it almost invisible during this movement, but when the leaps are long and rapid the free margin of the thin membrane may be seen flapping gently at each spring and may, possibly, to a slight extent impede its motion and would undoubtedly prevent a still more rapid progress. And here we seem to see a limit reached in the modification of an organism for existence under two diverse conditions, as it is evident that a greater development of this wonderful parachute to attain a freer aerial motion will hinder the terrestrial motion, and similarly by a lesser development the movement on the ground will profit at the expense of movement in the air. When the attention is aroused or the curiosity excited, all motion is immediately checked; the animal stands firm, motionless and intent; the body is often raised or even erected on the hind limbs in the endeavour to discover the cause of the excitement; the expression is fixed and attentive; the head is often raised and may be turned from side to side or directed intently towards the sound or object of its alarm; the eyes are widely opened; the ears are elevated; the skin over the nostrils is wrinkled and the vibrissæ are directed forwards and vibrate slowly as though, like the wide-open eyes and elevated ears, these tactile hair were of good service to the creature in discovering the cause of a distant excitement. It is, however, improbable that the vibrissae perform any definite sensory function under such conditions but, since they are most valuable as tactile organs when directed towards objects with which they can come in contact and the nature of which they are endeavouring to ascertain, it seems likely that their movements may be reflexly called into action in the determination of all causes of excitement, near or distant, even when, as tactile organs, they could produce no effect. When the body is raised erect the hind limbs are flexed and the animal sits upon its haunches; the fore limbs either hang downwards or are extended towards the exciting agent, as though to grasp it. The parachute is folded and concealed. The position of the tail is variable but it is interesting to observe that, on certain occasions, when attention or curiosity is aroused, the tail, which was either elevated or curled over the back, is permitted to sink gently backwards owing to a complete relaxation of the elevatory muscles. Thus the definite mental concentration of curiosity is associated with a definite muscular tension of all those parts which tend in any way to the satisfaction of that curiosity and, apparently, also in a definite relaxation of those parts which are not so connected, for what value the tail could be for such a purpose no one can say. But the external manifestation of internal in so gentle and passionless a creature. The

eyes, which in the cruel carnivora soften in love or flash in anger, are lustrous, staring orbs, changeless in all passions, motionless in all excitement. When angered the ears move backwards for protection; the claws are fixed and ready to strike the object provoking its resentment; the mouth is opened and the little teeth are fixed for the attack; the vibrissæ move forward as though to discern the cause of the provocation and the animal utters a gentle vibrating growl. In the Common Squirrel, when alarmed, the hairs of the tail are often erected, but this does not seem to occur in the Flying Squirrel. In fear the ears are again retracted; the head is drawn in towards the trunk and the whole body shrinks backwards. It is recoiling and retreating in its fear when suddenly it turns, scampers off, springs upon a tree-trunk and scrambles for safety amongst the branches.

In the tree (Fig. 2).

The ascent of the tree-trunk is rapid and skilful. It consists of a hand-over hand motion of both fore and hind limbs, though, under favourable conditions, the animal may advance by a series of short leaps. The face is directed upwards; the body flattened and both chin and belly are in close contact with the tree. The toes are flexed and the strong curved claws are bent inwards to grasp the smallest irregularities of the surface, though they do not penetrate to any appreciable extent; the parachute is almost entirely concealed, though at each movement a small angular fold of membrane is revealed at the junction of the body with the limbs, and when the animal stretches forwards or backwards, to grasp a distant foothold a large and irregular expanse of parachute becomes visible which gives to the creature a strange and unreal appearance.

But the branches of the tree is the squirrel's true home, and it is here that the dexterity of its movements and the remarkable method of maintaining its balance excite the greatest wonder. On a strong bough where the squirrel can maintain a firm and secure resting place its ease of motion and mode of progression resemble closely those attitudes and movements which are characteristic of the animal when resting on the solid ground; but as it wanders out among the smaller and less stable branches or nimbly springs from a swaying perch to a new position of security, there are called into action fresh attitudes and fresh movements, all most beautifully adapted to the varying conditions of an arboreal existence. It rests seated most usually across the branch with body curved and the hind quarters drawn well forward, so that the hind limbs, which are flexed, come well up to the fore limbs and grasp the support almost in the same transverse line; the fingers and toes are bent and the curved claws seize the roughened surface; the parachute is concealed save for a narrow white sinuous fold which winds beneath the lateral aspect of the body; the head and neck are stretched forward and the tail hangs vertically down behind. Now this position of the tail may be considered as almost without exception when the animal is seated in an even balance on a thin branch; it is not the sole effect of gravity as the whole organ is under a distinct muscular control; and, moreover, it is a position of great importance and performs a most definite function in the maintenance of the bodily equilibrium. For, when the animal is thus resting on a narrow support there is a comparatively small portion of the posterior part of the body jutting out backwards over the branch, owing to the haunches and hind limbs being carried well forward, in order that the latter may advance to meet the fore limbs. But, on the other, the head, neck and anterior portion of the body project well in advance of the branch in front and there is thus an excess of weight in the larger projecting fore body above that in the smaller overhanging hind body, and were it not for some accommodating

mechanism the equilibrium would be unstable. The tail produces this accommodation for by hanging vertically down behind, it gives to the hind body that additional weight sufficient to counteract the excess in the fore body. Were the tail curled forward over the back, as occurs when the animal is resting on a broad and firm surface, then a still additional weight would be thrown to the front and the balance would be disturbed and at the same time the elevation of the tail would raise the centre of gravity of the animal, and this would still further tend to increase its instability. The tail, therefore, in this position, maintains the bodily balance and does so in two ways ; by the addition of weight to the posterior part of the body and by lowering the centre of gravity of the animal, both of which tend to the production of a greater stability. It is interesting to place a captured squirrel of this species on a smooth cylindrical metal bar into which its claws cannot penetrate or can scarce obtain a foothold and to observe the beautiful equilibrium of the body and the great part played in its maintenance by the downward prolongation of the bushy tail. It can be immediately recognised that the position of the tail is not due to the sole effect of gravity forcing it to hang downwards, but that it is fixed there by a definite voluntary muscular action and the distinct resistance offered by the animal towards any artificial attempt to raise the tail from its normal position cannot be mistaken.

But the function of this organ as an agent for the preservation of the bodily equilibrium deserves a little further consideration. Should the animal, when seated on a thin branch, stretch forward its head and fore body to an unusual degree, then the tail is immediately elevated, the hind arm of the lever is consequently lengthened and the general equilibrium directly restored. Should, on the other hand, the reverse movement occur and the hind quarters of the animal extend abnormally backwards and tend to overbalance the anterior portion of the body, then the tail is immediately swept forwards beneath the branch and thus succeeds in recovering the balance. In this latter case, it might have at first been considered that the very characteristic movement of the tail over the back would be equally efficacious in producing this result, but a movement's reflection will show that such a movement would primarily be associated with an elevation and backward prolongation of the tail which would tend to further increase the bodily instability, and it would later, when the tail became curled over the back, bring about an elevation of the centre of gravity which would add still more to this undesirable result. A lateral inclination of the body to the right is counteracted by a gentle movement of the tail to the left and the converse is likewise true. The whole length of the organ is under a continuous voluntary muscular control, every tendency to overbalance in one direction is met with a counterbalance of the tail in the opposite direction and a uniform equilibrium, beautiful in its physical simplicity, yet marvellous in its nervous and muscular complexity, is thus attained. It is instructive to observe a squirrel of this species leaping and clambering from branch to branch and to endeavour to follow the motion of the long tail as it sways backwards and forwards, to the right and to the left, and to recognise that its slightest movement is directed towards some object, is to attain some end. On occasions the animal may reach a still more difficult position, where its every effort and all its powers of balance must be forced into action in order to retain the bodily equilibrium, and then, as it staggers on its insecure support, the tail is thrown into a series of rapid and complicated movements which perplex the mind in the endeavour to follow them. But by no means so easily as by a simple experiment can this balancing function of the tail be immediately demonstrated. If in a captured animal the tip of the tail be fastened to the

neck so as to compel the former to lie permanently over the back and the squirrel be placed on a thin branch, it will be seen to make vain attempts to retain its balance, the tail will struggle with its bonds in the endeavour to become free and, if the surface be smooth, the animal, though violently clutching at its foothold, may tumble completely over and cling with its flexed claws to the undersurface of the branch. As the performer upon the tight-rope keeps his balance by raising or lowering a long wand which he holds within his hands so has Nature for the same purpose supplied this creature with a living and pliant wand and the longer it may be, the more powerful, accurate and sensitive will be the function it performs until, as in this species, it becomes longer than the body which it balances and requires to be coiled away for protection over the back. On occasions the Flying Squirrel completely inverts the normal position of the body and hangs back downwards on to the undersurface of the branch. The tail, under such conditions, becomes curled round the branch from which the animal is suspended, and its position cannot but suggest to the mind that it actually is in use as an organ of support, and indeed it would only require a slight increase in the muscular tension in order to become so. Now in this striking attitude we may possibly detect one of the evolutionary gradations in the development of the prehensile tail, a trace of a gradual passage from an organ of equilibration to an organ of prehension, from an organ which in the Flying Squirrel maintains a wonderful balance upon the tree-top to an organ which grasps the branches and sustains the body even in so marvellous a degree as is seen in the Cebidæ of the New World.

Though descent from a higher to a lower level is peculiarly an aerial motion yet the animal can well climb face downwards along the trunk of a tree or, by lowering the fore limbs while still retaining the grasp with the hind limbs, may allow itself to sink gently from a higher to a less elevated branch. The descent of the tree-trunk is head foremost: the body is closely applied to the tree and the mode of progression resembles a succession of scrambling leaps. The fore feet are somewhat separated and the claws check the downward motion; the hind limbs are prolonged backwards and the outer two or three claws cling into the irregularities of the surface and sustain the body. The hind feet appear to have undergone a partial rotation from their normal anatomical position, for the toes, which are outermost when seated on the ground, have become innermost when the limb is backwardly extended during the descent of a tree, but the movement does not seem to attain its object in complete perfection for it is usually but the inner two or three claws which meet the surface and only in very favourable conditions can all five be called into action: The tail, which if unrestrained by any muscular effort must hang downward over the animal's back, is rigidly maintained in an upward perpendicular position; the parachute is almost entirely hidden and it is only when the limbs become widely outstretched that any considerable extent of its surface appears in view which at times may give the animal a most fantastic shape.

The day is passed in a state of sleep during which the squirrel lies curled away in a sheltered hole or quiet corner of the tree. The body is coiled and rests either on its side or belly: the head is turned down towards the tail and tucked in between the hind limbs which are carried forwards to protect it on each side and the fore limbs are flexed beneath the chest. A closely allied species, *Petaurista phillipensis*, has been described as "lying on its back with the legs and parachute extended, a position it is fond of in sultry weather." I have never seen a similar attitude in this species and it is possible that a posture adopted for the purpose of cooling the body by a species which inhabits the tropical forests

of Central India would not be developed to a like extent in a species which dwells on the temperate slopes of the Himalayas. But, at times, if disturbed in its sleep, the limbs may be widely stretched apart and the parachute extended, yet this is only a temporary movement associated with a sensation of fatigue and one which we see illustrated more frequently and more fully in many of the higher mammals. In the attitude of sleep the parachute is almost always concealed except for a wavy white line at one side of the curled body formed of an intermediate downwardly directed convexity prolonged at each extremity into a similarly directed concavity. The thick bushy tail is coiled over the neck or across the head and this serves to protect the eyes from the glare of the light and to provide a warm covering to the head.

The attitude adopted when feeding is pretty and characteristic. It sits with arched body erect upon the hind quarters and grasps the morsel of food in the fore paws, though it will occasionally take it with the mouth directly from the ground. Sometimes one paw is used for this purpose and more uncommonly the food is seized in the hind paws and brought sufficiently far forward in them to reach the mouth. The hind limbs are wide apart; the head is bent down; the ears are moderately elevated; the tail is directed forwards beneath the body or is often curled upwards over the head; the nostrils vibrate; the vibrissæ delicately quiver, the teeth work rapidly; the mouth is in continual motion and the animal utters a gentle lapping sound. The food is clutched in the flexed fingers but is not held there firmly; it is undergoing a gradual rotation in the paws so that the animal is continually biting at a fresh surface and nibbling first one part, then another part until the whole is consumed.

All these attitudes and movements on the ground and in the tree, the objects for which they are performed and the emotions with which they are peculiarly connected, cannot but excite an intense interest in the mind of any who observe them, but it all sinks to nothing in comparison with that sense of wonder which we experience when we see this nimble creature stretch wide its limbs, extend its parachute and glide swiftly through the air.

Through the air (Fig. 3).

The movement in the air is the most beautiful to observe but the most difficult to investigate. It is purely a gliding or volplane motion. The parachute in no way furthers the advance of the animal by any muscular activity: it firstly sustains the body in the air and allows the primary leap to continue to its full effect, and secondly, owing to the pressure of the underlying air on the widely extended membrane when the squirrel is descending obliquely, the animal tends not only to be sustained but to be thrust forward by a horizontal force in the direction in which it is moving. Before the primary leap takes place the animal looks steadfastly at the object towards which it is about to spring; the head is often thrust forwards and backwards as though undecided at the practicability of the movement; the body may at the same time be repeatedly elevated and depressed; the eyes are wide and staring; the animal moves well forwards on to the front of its support and with a sudden jerking motion forcibly straightens the hind limbs and propels the body swiftly into the air. The limbs are immediately extended; those in front are stretched out at right angles to the body while the hind limbs, though widely separated, are somewhat prolonged behind. The outstretched membrane is tense and firm, yet it inclines to arch upwards before the pressure of the underlying air and this gives to the upper surface of the animal the appearance of a uniform convexity. The claws project in readiness to grasp their foothold at the termination of the movement, the head is directed downwards and the tail

is rigidly trailed behind. Downwards and onwards it swoops in a beautiful gliding motion, ever increasing in speed as it draws nearer and nearer to the lower limits of its "flight," when suddenly it seems to swerve; its momentum raises it a few feet upwards; its pace checks and its curved claws strike inwards and cling into the tree as it reaches its goal in safety. The tail has been considered to act as a kind of rudder by which the animal can guide its movements and actually change direction when in the air. I have never seen the gliding motion take place in any direction but that of a straight line except in the sudden elevation at the termination of the "flight." Moreover it is extremely improbable that Nature would have provided the animal with a steering gear in the form of an elongated and cylindrical bushy tail; it appears more probable that it acts as an organ of balance, for of what value could the similar long bushy tail be to steer the Common Squirrel which never flies. Just as the tail of a bird cannot act as a rudder because it is compressed in the wrong direction, so also it is unlikely that the tail of the Flying Squirrel will possess a steering function as it is not compressed at all. It has been shown that when the animal is seated on a branch an excess of weight in the anterior portion of the body is counterbalanced by an elevation of the tail which increases the leverage power of the posterior part of the body, and when the Squirrel is gliding through the air the obliquity of its position produces a considerable depression of the anterior body which would tend to upset the equilibrium and cause the animal to topple over were it not that the tail prolonged out rigidly behind was sufficient to counteract the forward depression and result in the maintenance of an even balance.

As closely as I could estimate, the square surface of a rather small specimen, with parachute folded, was 33½ square inch and, with parachute widely extended, reached 116 square inch and this gives to the animal, when in the air, an increase in square area of three to four times over that which it occupies when at rest.

The distance over which the gliding motion will carry the animal is very considerable and Jerdon records a flight which extended to sixty yards. The Common Squirrel, though possessing not the vestige of a parachute, will, when performing leaps of any considerable extent, stretch out its limbs and extend its long bushy tail. This position may possibly support the animal to a slight extent and may be considered as the first step in the succession of evolutionary gradations towards the development of a distinct sustaining membrane which ultimately increases to almost a fourfold degree the supporting power of the animal.

Nature controls with prudence all the varied parts of her beautiful dominion. There is no squander, nothing superfluous yet every corner is amply filled with living creatures marvellously adapted to their conditions of life. Miles aloft in the blue sky, in the profound depths of the boundless ocean, everywhere swarming on the surface of the land can be seen these wondrous modifications with which Nature has provided all the living inhabitants of her world. Few creatures play a more lovely part in this economy of existence than the little Flying Squirrels of our empire.

No. V.—ALTITUDE TO WHICH ELEPHANTS ASCEND.

In the *Illustrated London News* of April 18th there is a diagram showing the vertical distribution of animal life.

Amongst the animals shown, the Indian Elephant is placed at 5,000 ft. During the recent Aka expedition, we found Elephants on the Butan-Tibet boundary at a height of 10,200 ft. It would be interesting to know if they have ever been observed formerly at this height. The elephants

seem to ascend from the main valley (5,000′) during the hot weather, from which there was a broad well trodden Elephant path to the ridge above. The whole ridge above 8,000′ is covered with rhododendrons with occasional pine trees.

Lesser Rhino were found in the main Valley at a height of over 5,000′. I understand that the Lesser Rhino was observed at considerable elevation in Burma, but can find no reference to the exact height.

A. L. M. MOLESWORTH,

SHILLONG, ASSAM, *7th May* 1914. Capt., 1/8th Gurkha Rifles.

No. VI.—COMMENSALISM BETWEEN MONKEYS AND TSAING AND DEER.

On page 731 of Vol. XXII (No. 4) of the Society's Journal, mention is made of Chital and Sambhar being found in close vicinity to herds of monkeys. The reason given by Mr. C. H. Johnstone is, I have no doubt, correct. Quite lately I was out after Tsaing in the Kalka district and got up to a small herd of two bulls and four or five cows feeding under a wild mango tree. These trees unlike the cultivated variety assume, proportionately speaking, huge dimensions in Upper Burma. I noticed at the same time a commotion in the branches high up and using my glasses detected some 8 or 10 monkeys—the long tailed variety feeding on the fruit. I had two Burmese trackers with me and having come up to the herd very quietly I was able to get a very good view and for quite 15 or 20 minutes. The animals down below were moving about freely picking up the fruit as it fell from above. The bulls had immature heads so I was not shooting. Later in the day I came across, I should say, half a dozen other such trees and under all of them numerous tracks of Tsaing (Banting), Gyi (Muntjac) and pig. Of course at this time of the year the fruit naturally falls as it ripens but there can, I think, be no doubt that the presence of monkeys in these trees offers an inducement to deer and other animals to seek association with them. My Burmese trackers told me that Hsaing have a special penchant for the fruit of the mango and that till Bamboo shoots are available it was always possible to get a chance of bagging a decent Tsaing where these trees were to be found.

W. WALSH.

CAMP KYANKINYAUNG, 16*th June* 1914.

No. VII.—THE BARKING DEER OR MUNTJAC (*MUNTIACUS VAGINALIS.*)

Reading up R. Lydekker's book on the "*Game Animals of India*" I came across various statements which are not in accord with my personal observations.

For instance this author calls the *Muntiacus vaginalis* a strictly nocturnal animal, whereas in the Bombay Ghats I have on frequent occasions seen a "bekar" grazing in the open as late 9 a. m. and on one occasion shot a buck on a grass covered projecting bluff above "Tigers leap." Lonauli, as late as 10 a.m. where it was feeding. It was however on a somewhat cloudy day.

The "bekars" of the Bombay Ghat also do not seem to shed their horns regularly in May, as I have shot a buck with old horns in the middle of June.

Presuming that perhaps the above notes may not be quite devoid of interest.

M. F. SUTER.

BOMBAY, *8th August* 1914.

No. VIII.—BREEDING OF WILD PIG (*SUS CRISTATUS*).

On 15th April 1914, I saw them *in copula*. On 20th-25th May I shot two sows with 7 and 5 embryos practically fully developed, *i.e.*, with all parts of the bodies well distinguishable. The 7 were more advanced than the 5. One of the 7 was given to Mr. C. A. Crump for the mammal survey, but the others I did not keep. On 18th July a lot of young ones were caught and others were killed. Some were only about one day old, as their navel strings had not dried up and fallen off, others were two or three days old and there were others which were anything from 10 to 15 days old.

All these little pigs were marked very similarly to the 5 striped squirrel (*Funambulus pennantii*).

On August 5th, I obtained two young females not more than 24 hours old. These two were very dark as regards their stripes, in fact very like some of the very dark squirrels (*F. pennantii*) Mr. Crump send you from Nirnia ghat.

Whilst beating my men came across a freshly made shelter, showing that a sow was about to produce, and as a result we were able to trace the sounder which was close by, but unfortunately I was unable to secure any as my rifle failed me. On September 11th while out shooting some of my beaters picked up the body of a squeaker not more than 48 hours old (the navel wound was not completely healed) which had evidently been killed by a sow biting a large piece out of its face.

O. A. SMITH, Major.

Hazaribagh District, 19*th July* 1914.

No. IX.—WILD PIG (*SUS CRISTATUS*) CROSSING WATER.

This morning just after dawn I saw seven pigs cross the Burakar river, current about 1½ miles an hour, point of crossing about 45 to 50 yards wide.

Two were full grown sows ? and five were very small squeakers.

The squeakers followed close behind the two grown up pigs.

O. A. SMITH, Major.

Hazaribagh District, 17*th August* 1914.

No. X.—SHAN NAMES FOR MAMMALS FOUND IN THE NORTHERN SHAN STATES.

Gibbon, *Hylobates hoolock*	Wu-Wa.
Langur, *Presbytis* (*phayrei* ?)	Ling-Kang.
Assam Red Monkey, ? *Simia rhesus* ..	Ling-Leng.
Loris, *Nycticebus sp. ?*	Ling-Lom.
Tiger, *Felis tigris*	Hso-Lai-Kai-Kawn.
Panther, *Felis pardus*	Hso-Son-Kin.
Tiger Cat, *Felis sp. ?*	Hin-Wap.
Panther Cat, *Felis bengalensis*	Hin-Kuk.
Jungle Cat, *Felis affinis*	Hin.
Civet, *Viverra zibetha*	Amnge.
Mongoose ? *Herpestes sp. ?*	Meng-Na-Len.
Wild dog, *Canis rutilans*	Ma-Biton.
Jackal, *Canis indicus*	Ma-Nai.
Shan Dog, (Domestic)	Ma-Tai.
Badger, *Helictes sp.* ?	Mu-Ma.
Otter, *Lutra sp. ?*	Mun or Wun.
Himalayan Black bear, *Ursus torquatus* ..	Mi-Ma.

Malay bear, *Ursus malayanus*	Mi-Keng.
Musk rat, *Pachyura sp.?*	Nu-Sang-Uga.
Flying fox, *Cynopterus sphinx?*	Mang-Ku-Law.
Small bats	Ming.
Flying Squirrel, *Petaurista sp.?*	Sawn Peu.
Small flying squirrel, *Sciuropterus sp.?* ..	Sawn Hawk.
Small squirrel, *Sciurus sp.?*	Sawn.
Giant squirrel, *Ratufa sp.?*	Ma-Mai.
Jungle rat	Nu-Pak.
House Rat	Nu.
Mouse	Nu-Awn.
Water Rat?	Nu-Nam.
Large Bamboo Rat, *Rhizomys sp.?* ..	Ou.
Small Bamboo Rat, *Rhizomys sp.?* ..	Tawn.
Porcupine, *Hystrix sp.?*	Men.
Hare, *Lepus peguensis*	Pang-Tai.
Elephant, *Elephas maximus*	Sang.
Rhinoceros	Song.
Bison, *Bibos gaurus*	Wo-Leng.
Tsaing, *Bibos sondaicus*	Wo-Lam.
Domestic buffalo	Kwai.
Domestic Ox	Wo.
Horse	Ma.
Ass	Li.
Mule	Ma-Law.
Goat	Pe.
Sheep	Hso.
Serow	Yung.
Barking Deer, *Muntiacus vaginalis* ..	Hpan.
Hog Deer, *Axis porcinus*	Sat-Hkai.
Thamin, *Pangolia eldi*	Tong.
Sambur, *Rusa unicolor*	Kwang.
Wild pig, *Sus cristatus*	Mu-Hton.
Domestic pig	Mu.
Pangolin, *Manis sp.?*	Lin.

F. S. GROSE,

Assistant Superintendent,
Northern Shan States.

9th May 1914.

No. XI.—FEMALE BLACK BUCK WITH HORNS.

In December last near Nishangara, Terai, I shot a female black buck with horns. She was with a herd of about 12 others does. I examined her after I had shot her and found her to be a perfectly normal female in every respect and also as regards the colour of her coat.

I enclose a photograph of the head. The long horn measures 20⅗ inches round the curves and is rather loose about 10 inches from the base. I imagine that in a few weeks the upper part would have fallen off. The other horn as you see is broken. The horns have not separated from the skull as in the case with a buck.

I should be much interested to know whether a case of a female with horns has ever been brought to your notice before and if so what is the maximum length of head recorded.

I have never heard of such a case before and as I can find no one else who has I thought I would write and ask you hoping that you would be able to give me some information on the subject.

I saw quantities of buck in this district but none were worth shooting as I never saw one with a head which I judged to be more than 17 inches.

A. A. FENN, Lt.,
3, Royal Fusiliers.

LUCKNOW, 27*th January* 1914.

[There are several records of female black buck with horns. In the Society's Museum there is a head of afemale with horns, shot near Umballa on 9th December 1883 by Colonel J. H. Yule. This head is peculiar in having no definite rings on the horns but a polished smooth surface.

In Vol. II of our Journal, p. 9, the late Mr. R. A. Sterndale figured another head in the possession of H. H. the Maharaja of Jodhpore. In the *Field* for 15th March 1876 there is an illustration of another female head with horns which was shot at Etah, U. P., and sent to Mr. D. Craigie-Halkett. Besides these three heads, a fourth which is figured in *The Book of Antelopes*, Vol iii, p. 14, is in the Hume Bequest in the British Museum. According to Mr. Lydekker in the *Catalogue of Ungulates* the head come from Gurgaon and the horns "bend outwards and downwards in a homogeneous curve, the first turn being continued to form a regular curve."

The Umballa and the Etah heads are very similar in shape but in the latter specimen the horns are ringed just as in an ordinary male animal.

Malformed heads of males similar to the above photograph are not uncommon and if it had not been vouched for by Mr. Fenn as a female we should have taken it for a male which had received some injury possibly to the generative organs, resulting in the horns being deformed.—EDS.]

No. XII.—TSAING (*BIBOS SONDAICUS*) FOUND WITH VILLAGE CATTLE.

With reference to the article from Mr. Hauxwell appearing in Volume XXI, No. 3, at page 1072 on the above subject the following additional facts may be of interest. While touring in the Mansi Division on 3rd May 1914 I happened to be within 8 miles of Kyaungle and heard that the wild Tsaing was again out with the village cattle. Having moved camp next day I sent out men on arrival to see where he was to be found about 2 P.M. I was told that he was about a mile away in some paddy fields. I rode out with two ladies of my party and saw him in a bare dry field with a herd of about 30 or 40 village cattle. At first we remained on our ponies about 50 yards from him and watched him. After a time I rode up closer and watched for a bit and then dismounted and stood watching him for a little while. He started feeding towards me and took no notice of me allowing me to get within 5 yards of him. He seemed to be a young bull carrying horns about 24″ with corrugations for about 6″, was in very poor condition probably due to his long spell with the village cattle, where the feeding is not very good, and his living too much exposed to the sun. While I watched him I noticed that he seemed to be paying particular attention to one cow and while the cattle were grazing he frequently lay down until the herd

moved off, when he stood up and went towards the herd. Three times I distinctly saw him lower his head and make a sound like a low "moo" of a cow. He does not seem to interfere with the other bulls but as soon as a bull approached the cow he was paying attention to, he merely stopped feeding and looked at the intruder which sent the latter away pretty quick. The villagers tell me that when he first appeared among their cattle he was challenged by the pick of the herd and they fought for half an hour when the village bull was severely punished, since then he has not attempted to molest the village bulls, who have generally given him a wide berth.

He had often followed cows in season but so far there has been no apparent result. On enquiry from the villagers as to the reason of this they informed me that owing to his build and height he could not reach down low enough for the ordinary Burman cows. Whether this is so or not I am unable to say. This is the fifth year that he has spent the dry weather with the village cattle. He is held in great reverence by the villagers who state that they have been very lucky with their crops since he appeared. He has never been known to appear before crops have been harvested except once when the harvest was late and then he was seen once but is supposed to have gone back to the forests and returned when the harvesting was completed. A buddhist monk who is a bit eccentric endeavoured to put a bell round his neck this year, in order to reduce the chances of a strange sportsman shooting the animal by mistake; he succeeded in getting within touching distance of the animal and was about to buckle on the bell rope round his neck when the Tsaing moved away. I saw this monk and he assured me that he would yet do this and I can quite believe he will.

I regret very much that I had not a camera with me as I could have got some very good photos.

T. W. FORSTER,
Divisional Forest Officer.

MANSI DIVISION, KATHA.,
2nd July 1914.

No. XIII.—NOTES ON BURMESE TAKIN.

Very many thanks for your letter about the takin and other skins. I am glad they arrived safely, but I do not feel that I deserve much thanks for I merely packed and brought them down from Htawgaw; they were collected entirely by Mr. F. C. Lowis, C. I. E., P. W. D.

As to the exact locality, it was at the head waters of the Ngaw Chaung, a tributary of the N'maikka, that they were killed—the takin, that is, the other skins came from various places in the same region; all on the Burma side of the Irrawaddy-Salween divide, roughly lat. 26° to 26° 30′ and long. 99° 15′. The range varies in height from 11,000 ft. to 14,000 ft. in this region running like an immense white wall due north and south for unknown miles.

I went up with my husband this spring as far as Hpimaw Fort just on the Burma side of the frontier (lat. 26°) in the course of his official inspection of Mr. Lowis' road construction, and as Mr. Lowis himself was not coming down till the rains we brought down the skins for him.

The Yawyins (or Lissus) hunt takin with dogs, shooting them with aconite poisoned arrows when the dogs bring them to bay. Only the old males stand, the females and youngsters thus escaping.

They are I believe never found below 10,000 ft. but the range is covered with fairly dense vegetation including dwarf bamboo quite up to that altitude.

CHARLOTTE T. W. CUFFE.

UPPERFOLD, MAYMYO, *27th July* 1914.

No. XIV.—ABNORMAL SAMBHAR HORNS.

In Volume XXII., page 391, I notice a query and reply about record Sambhar *Rusa unicolor* heads; in this connection the accompanying photograph and measurements of a head I have often seen may be of interest.

Measurements of the above Sambhar shot at Simmaria, C. P., January 7th, 1899, by Mr. B. E. Carey, C.S.I., C.I.E., now Commissioner, Sagaing, Upper Burma:—

	Right.	Left.
Length on curve outside	$42\frac{3}{4}$	42
Girth above burr	$8\frac{1}{2}$	$8\frac{1}{2}$
Length of browtine from burr	17	$17\frac{1}{2}$

12 points in all.

C. T. W. CUFFE (Mrs.).

Upperfold, Maymyo, 27*th July* 1914.

[At page 46 of Vol. II of the Journal will be found a plate figuring two abnormal Sambhar heads which were some 28 years ago in the outer court of the Jeypore Museum. Mr. R. A. Sterndale in referring to these heads mentioned their resemblance to the Kashmir stag (*Cervus kashmirianus*) and we think members will agree that the similarity is also apparent in the head figured above by Mrs. Cuffe.

Eds.]

No. XV.—NOTES ON BURMESE SEROWS.

In Volume XXII, p. 296, there appears a most interesting article on Serows and I send you photographs of two of these queer beasts, also a water colour drawing of the red one shot by my husband in 1899, which I painted a few hours later when it was brought into camp. You may notice the difference in the shape of the nose between the drawing and the photograph; the drawing is correct: the nose was like a calf's, *not* like a deer's.

The other photograph is of a tame serow we had for some time in Toungoo. A most quaint beast, very affectionate and extraordinarily tame with those he knew. He used to insist on coming upstairs and lying on the carpet beside the piano in my drawing room and he would allow no stranger inside

Height at withers 3′ 1½″, length of horns 10½″, circumference 5″.

the compound after dark. He hated the natives of India, but was quite friendly with Europeans or Burmans and his delight to see his former owner when he came to visit him was quite touching. He was captured as a kid by an old Burman villager of Thawati at the foot of the Pegu Yoma, who thought the dam must have been killed by a leopard after bein chased by it out of the hills.

"Amg Bala," as we called our serow, was most regular in his habits, he went out to graze at 4 a.m. jumping over the compound gate with the greatest ease and returned on the stroke of 11 to sleep. At 3 p.m. he went out again, usually first taking his stand on a point of the high bank over-

looking the Sittang river which flowed just under the house, whence he snorted defiance at all comers and then cantered off to feed, sometimes inside and sometimes outside the compound as the fancy took him. He always came back at dusk trotted into his shed and lay down like a dog, first goat-like dropping on his knees. The strangest thing of all was that he made friends with my pet leopard and I once actually saw the leopard stroking his face with his paw, the serow apparently thoroughly enjoying it. The serow was to have gone home to Woburn, but both he and the leopard unfortunately died. I afterwards had a baby (female) serow from the Karen Hills which would not drink cow's milk unless there was salt in it, but she also died when about three months old. She was just as tame as a domestic goat. Both these were almost jet black on the back with pepper and salt greyish sides and reddish legs.

"Amg Bala's" skin is now set up in the Dublin Museum and the skin and head of the red serow are at Leyrath, in Kilkenny.

CHARLOTTE T. W. CUFFE.

Upperfold, Maymyo, 27*th July* 1914.

[The above figure is a reproduction of Mrs. Cuffe's excellent sketch of the Red Serow. The red Serow is apparently *Capricornis sumatraensis rubidus* and the two young ones *sumatraensis milne-edwardsi* of Mr. Pocock's paper in Vol. XXII of of the Society's Journal. Ed.]

No. XVI.—SEROW, GORAL, ETC.

In Volume XXII, No. 2 of the Journal is a very interesting communication by Mr. R. I. Pocock on the above-named animals. On the 18th March 1897 a short paper on the Burmese Serow submitted by me was read before the Society. From later knowledge I have come to the conclusion that these animals are distributed more or less throughout Burma and its frontiers, *i.e.* on most of the hill ranges of high or low elevation which are forest clad and are in other respects suitable to serow. Not very long ago a sportsman went from here to a station some 40 miles up the Prome line and then did a tramp over the low hills not far off where he secured a good specimen. I have never seen one in the hills to the west of Pegu or Toungoo, or in the ranges between the Sittang and the Salween, but have time and again had ample evidence of their presence in those localities. A friend secured a young animal in the Toungoo hills which unfortunately died. They may be met with from the Akyab District right through the Arakan ranges. They have been obtained in these hills in the Arakhan Hill Tracts, Thayetmyo, Minbu, Pakokku districts, etc. Judging from the number of skulls I met with in the houses of Chiefs and villagers in the Northern and Southern Chin Hills there must have been quite a number. It is well known that they are present in other ranges in the Upper Province and Shan States. I can to some extent endorse the statement made by Mr. G. W. Bird and quoted by Mr. Pocock on page 309. I would not say they are common, if this is meant to imply that they are very numerous. About ninety miles from the mouth of the Salween where one of its affluents (Yonzalin) runs in from the west, the hills to the east recede while those to the west grow rapidly less in altitude, and the river enters a more open and comparatively level country, small isolated limestone hills may be observed at intervals on both banks and also inland rising abruptly from the plain. The hills may be single, in groups of two or three or even constituting a small chain, some are low, none very lofty, but all with naked jagged cliffs the tops often appearing as serrated ridges. These hills are invariably difficult to climb so the tops are I imagine rarely visited by European sportsmen and not often by the

Karen villagers. The rocky ravines are well timbered and afford ample shade. Certainly on several of these hills as also those up the Ataran river serow are present, perhaps a couple on a hill or in some favoured locality a few. To hunt these animals a good *hund-o-bust* is necessary, good beaters who will not evade climbing difficult places, and one or two men acquainted with the habits and haunts of serow to station stops and place the guns. It is not often one can make such arrangements hence unless in great luck one may do a good many stiff climbs and then be disappointed. Prince Henry D'Orleans in his book "Tonkin to India by the sources of the Irrawaddy," on the trip from Hsekou to Khamti more than once mentions the *Nemorhædus* or 'Rock ass'—a very good name it is. There is no question that serow vary a good deal in colouration, some being very much darker than others and it occurs to me from Mr. Pocock's article that we may have sub-species: *rubidus* as well as sub-species *milne-edwardsii* in Burma.*

With regard to the Burmese Goral my first acquaintance with the skulls was in 1889-90 in the Northern Chin Hills, where some of the Chiefs had a number in their collections. It was however not till 1896 that I came on the animal. I then sent a skull to our museum which was identified as that of a female Himalayan Goral. Later on, having doubts as to whether the Burmese animal was the same, I asked a friend in India to shoot one and send me skin and head—this he did. It was evident then that the Burmese goral differed. It was not for a long time afterwards that I obtained other specimens, when it occurred to me that Mr. Lydekker might like a couple of skins, so I sent two home. As far as I am aware there is but the one species in Burma whether found in the Arakan or Shan ranges. The pursuit of these animals and serow afford the ordinary plains loving sportsman as much or more excitement than he bargains for.

Budorcas.—In the near future I am hoping to hear of some lucky sportsman obtaining a Takin and perhaps the Chinese Musk deer within our frontiers. I believe a herd of *Budorcas*, probably *tibetanus*, has already been seen, and their tracks have been met with more than once. That they exist on our outlying frontiers has been suspected for a long time past, skulls in many villages being fairly numerous and the hill men offering them as presents. The following measurements are of three Takin skulls from the frontier, probably average specimens.

Takin skulls from N.-E. Frontier, Burma.

——	1	2	3
Right Horn	21″	18½″	18′
Left Horn	20¾″	19″	17⅞″
Girth	R.H. 11″	10½″	11″
	L.H.11⅛″	10¾″	11¼″
Widest Span	16½″	15″	14¾″
Between Tips	10½″	11¼″	8¾″ * Tips blunted.

* The best head I know of in Burma is in the possession of Mr. L. A. Thruston and was shot in the Chin Hills.

Measurements—

R ght Horn 10¼″
Girth base 6⅛″
Le't Horn 10½″
Girth 6¼″
Between tips 5″

I think the Musk deer is certain to be found in the higher hills beyond Myitkyina. I have seen several skins and tushes which have been brought down. The owners seemed very proud of them and asked absurd prices.

G. H. EVANS, Colonel.

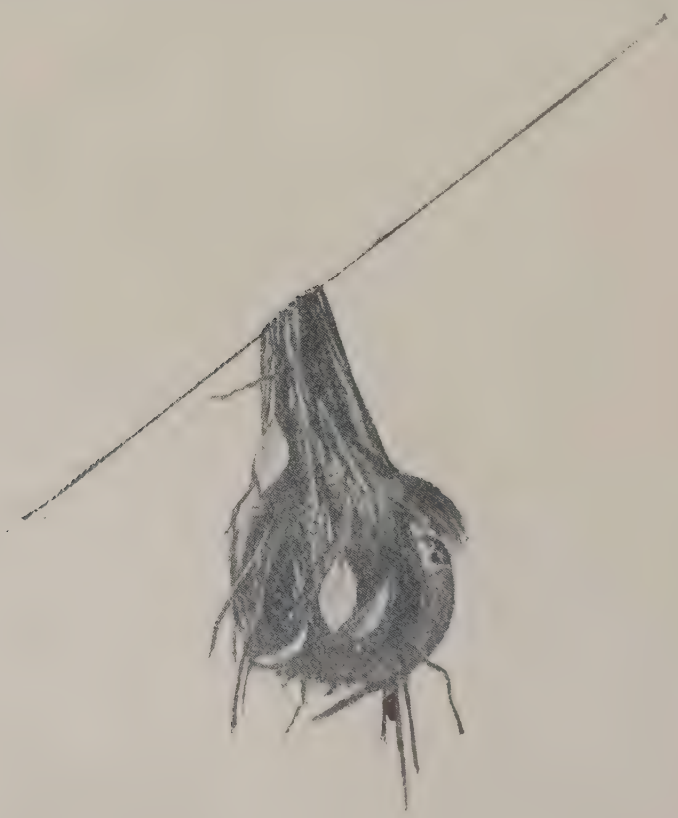
Rangoon, 1*st March* 1914.

No. XVII.—NEST OF THE LONG-TAILED BROADBILL ON ELECTRIC LIGHT WIRE.

As records of the nesting of the long-tailed Broadbill (*Psarisomus dalhousiæ*) appears to have been few, the following note may perhaps be of interest.

At Mussoorie last hot weather at 5,000 feet elevation, I noticed what seemed to be a mass of grass suspended high overhead from one of the electric light wires spanning a nullah, and, possibly, I thought, lodged there during a storm. But this year, seeing two of these, one about the same place on the wire as last year, I mentioned them to Mr. Vincent Mackinnon, who told me they were the nests of a rare bird.

On June 28th, seeing the pair of birds at the higher of the two nests, I told Mr. D. Dewar about them, and we next day visited the spot and got within twenty feet of the birds and their nest, and heard the young birds in the nest. The old birds, who remained silent, invariably perched on a bough close to us—sometimes both were there—before going to the nest; and one remained almost motionless in full view for about fifteen minutes, holding a green caterpillar in its beak. So we had had an excellent view of the birds, especially with the aid of field-glasses, the intense black of the cap, white loreal spot and bright orange-yellow of the throat in contrast with the green of the body, appearing extraordinarily handsome. The grey patch on the top of the head was only noticeable from behind.



On reaching the opening of the nest, the bird hangs with the tail pressed up against the nest. As it flew from the nest and below us, the blew of the wings and fanshaped tail, and the broad white bar on the underside of each wing showed up conspicuously.

The lower of the two nests on the wires—last year's—has slipped down the inclined wire, and its bottom portion has gone, but the porch seems to have been on the east side as in this year's nest.

The higher one, this year's nest, consists of twigs, fibres and a few leaves—the last apparently, merely accidental additions. It is about a foot long vertically and some eight inches across with a porch overhanging the entrance which is situated about the middle of the side facing up the nullah.

The topmost portion by which the nest is suspended is in both these nests very much stronger, and consists of many more twigs and fibres than the figure on page 1 of *Fauna of British India, Birds,* Vol. III, would indicate, and so prevents the nest being turned round or detached by the wind which would occur, if it were so slender as shown in the figure to which I refer—and I imagine the figure to have been drawn partly from description after the nest had been detached from its support.

I enclose a copy of a rough sketch made on the spot by me of this year's nest.

Last year the Electrical Engineer, fearing the birds might be killed by current from the wire, had attempts made to dislodge the nest, but as the birds persisted in building he left them alone. Each nest hangs from a lower wire: had either been on a higher one and touched a lower wire the birds must have been killed.

Apparently nothing but birds could molest a nest, thus suspended from the lowest of four parallel wires high above the nullah. The nest, containing at the time either eggs or young birds, has to my knowledge withstood in the past few weeks two tornadoes, both of which tore off roofs, one but half a mile from the nest, and flung them like sheets of paper over the tree-tops.

The collector of the late Mr. P. W. Mackinnon tells me that about eighteen years ago he first came upon a nest of this bird, suspended from a bough in the Jumna Valley and brought back the nest and the eggs which he says were white. Six years later he found another nest, and again six years ago he found one suspended from a bough in the Brewery nullah.

The call of the young birds in the nest somewhat resembled the alarm notes of a very excited pair of black bulbuls, who seemed to be abusing us freely—probably for being near their nest—and these two looked as if they had been too occupied with domestic duties to trim their top knots that morning, for they had a very dissipated, if not 'dotty' appearance.

Four very large beaks of an equal number of very small minhas appearing from under a roof near by indicated yet another hungry family.

H. D. PEILE.

Mussoorie, 4*th July* 1914.

No. XVIII.—BIRDS NESTING AT QUETTA.

Nest of Eared Grebe *(Podicipes nigricollis)* near Quetta.

It may interest you to know that I have found the following species breeding here this year. I should be obliged by your letting me know whether any of these instances are new to British India, as I am aware that vast studies have been made in Indian Ornithology since the "Fauna of British India" was published—

Magpie..	*Pica rustica.*
Red-billed Chough	*Fregilus graculus.*
Indian Grey Tit..	*Parus cinerus.*
Rock Nuthatch	*Sitta tephronota.*
Indian Great Reed Warbler ..	*Acrocephalus stentoreus.*
Moustached Sedge Warbler ..	*Lusciniola melanopogon.*
Eastern Orphean Warbler ..	*Sylvia jerdoni.*
Common Whitethroat	*Sylvia cinerea.*
Sykes' Tree Warbler	*Hypolais pallida.*
Upcher's Tree Warbler	*Hypolais languida.*
Streaked Scrub Warbler	*Scotocerca inquieta.*
European Striated Swallow ..	*Hirundo rufula.*
Gray Wagtail	*Motacilla melanope.*
Hodgson's Yellow-headed Wagtail..	*Motacilla citreoloides.*
Brown Rock Pipit	*Anthus similis.*
Skylark	*Alauda arvensis.*
Hume's Short-Toed Lark	*Calandrella acutirostris.*
Sharpe's Sand Lark	*Alaudula persica.*
Crested Lark	*Galerita cristata.*
Blue-cheeked Bee-Eater	*Merops persicus.*

European Bee-Eater	*Merops apiaster.*
Common King-fisher	*Alcedo ispida.*
European Hoopoe	*Upupa epops.*
European Nightjar	*Caprimulgus europæus.*
European Swift	*Cypselus apus.*
Common Indian Swift	*Cypselus affinis.*
Cuckoo	*Cuculus canorus.*
Hutton's Owlet	*Athene bactriana.*
Cinereous Vulture	*Vultur monachus.*
Egyptian Vulture	*Neophron percnopterus.*
Lammergeyer	*Gypaëtus barbatus.*
Allied Grey Shrike	*Lanius assimilis.*
Bay-backed Shrike	*Lanius vittatus.*
Rufous-backed Shrike	*Lanius erythronotus.*
Pale-Brown Shrike	*Lanius isabellinus.*
Rufous Shrike	*Lanius phœnicuroides.*
Indian Oriole	*Oriolus kundoo.*
Common Pied Bush-Chat	*Pratincola caprata.*
Pied Chat	*Saxicola picata.*
Isabelline Chat	*Saxicola isabellina.*
Indian Redstart	*Ruticilla rufiventris.*
Western Blue-Rock Thrush	*Petrophila cyanus.*
Rock Thrush	*Monticola saxatilis.*
Missel Thrush	*Turdus viscivorus.*
Red-Mantled Rose Finch	*Propasser grandis.*
Desert Finch	*Rhodospiza obsoleta.*
White-winged Grosbeak	*Pycnorhamphus carneipes.*
Gold-fronted Finch	*Metoponia pusilla.*
House Sparrow	*Passer domesticus.*
Tree Sparrow	*Passer montana.*
White-capped Bunting	*Emberiza stewarti.*
Grey-necked Bunting	*Emberiza buchanani.*
Crag Martin	*Ptyonoprogne rupestris.*
Common Swallow	*Hirundo rustica.*
Common Pariah Kite	*Milvus govinda.*
Black Kite	*Milvus nigrans.*
Kestrel	*Tinnunculus alaudarius.*
Indian Blue Rock Pigeon	*Columba intermedia.*
Little Brown Dove	*Turtur cambayensis.*
Indian Ring Dove	*Turtur risorius.*
Chukor	*Caccabis chukar.*
Seesee	*Ammoperdix bonhami.*
Kentish Plover	*Ægialitis alexandrina.*
Little Ringed Plover	*Ægialitis dubia.*
Black-winged Stilt	*Himantopus candidus.*
Bittern	*Botaurus stellaris.*
Eared Grebe	*Podicipes nigricollis.*
Indian Little Grebe	*Podicipes albipennis.*

You may wonder at this list. I wonder at it myself, but in every case when identification has been uncertain, the parent has been obtained. It is owing to the fact that this country has never been properly exploited ornithologically, that such unexpected species are found breeding here.

R. MEINERTZHAGEN, Captain.

Quetta, *July* 1914.

No. XIX.—NOTES ON DOVES IN THE PUNJAB.

Indian Red Turtle-Dove (*Ornopopelia t. tranquebarica*).

This species appears to arrive in the Multan and Lyallpur districts about the end of March and to commence breeding operations during the first half of April. In Multan it is found in large numbers wherever there are plenty of trees but I have also found them in scrub jungle where there are only Jand and Jal bushes. It is an extremely difficult matter to reduce bird notes to writing so as to be distinguishable but besides the "sustained purring coo," referred to by Mr. Whistler this bird has another very distinctive note which can best be described as Ooo-o-o-o repeated *ad lib.* The note is very deep and hoarse with the accent on the first syllable, the last three being very short and following rapidly on one another. Some birds have a bunch deeper note than others; but whether this is only the difference between the note of the male and female bird I am unable to say. As regards their departure, I have no information whatever as for the last ten years I have never returned to the plains till the beginning of October when I have always found that they have gone.

Indian Turtle-Dove (*Streptopelia turtur ferrago*).

So far I have never observed this bird in either the Lyallpur or Multan districts. It would appear, keep further north so as to avoid the desert tracts being a bird of thick forests.

Spotted Dove (*Streptopelia s. suratensis*).

Probably avoids the above districts, also in its migrations, as, so far, I have never observed it. Common about 5,000 feet in Dalhousie.

Eastern Stock Pigeon (*Columba oenas eversmanni*).

I have observed this species both in the Lyallpur and Multan districts in small numbers all through the cold weather during some years, but as a rule it does not appear till February when it occurs in large flocks up to the beginning of April. In Multan I have only found it in the vicinity of the Chenab River and in Lyallpur near the big canal escapes.

Treroninæ.

I have only once come across green pigeons in Lyallpur, but as I had no gun with me I was unable to identify the species. I have never observed them in Multan.

Wedge-tailed Green Pigeon (*Sphenocercus sphenurus*).

Common in Dalhousie, Murree and the Galis, but so far I have not observed it in the plains.

J. LINDSAY SMITH,
Major, M.B.O.U.I.A.

Quetta, 3*rd August* 1914.

No. XX.—SHOVELLER IN THE N. W. F. P. IN AUGUST.

I think the following unusual incident will interest you: A brother Officer and I were out after teal on Thursday last, (27th instant), and we

came across a full grown female Shoveller in a heavily reeded jhil totally unable to fly through the fact that all the wing feathers were in moult that is the quills were about 6 to 8 inches long each with a little tuft of feather (about 1 inch) just showing.

At first I was inclined to think it must have been bred here, but I doubt this as the bird was too brightly coloured, so it must have been a hit bird which stayed on here instead of flying north in March.

I notice this is a very early year for duck here. I saw a flock of teal on the river on the 12th, and Pintail and Gadwall and Shoveller on the 27th, the latter also on 25th.

Another curious thing about the moulting Shoveller is that the "jhil" is really a wet part of the grass farm near here and there are no reeds there at all till about June, the grass is all cut right down by February.

Have Shovellers been ever found breeding in the N. W. F. P. ?.

NOWSHERA, N. W. F. P., W. M. LOGAN HOME, CAPT.,
29th August 1914. 112th Infantry.

[As far as we know the nearest countries to India in which the Shoveller breeds are Turkestan and Northern Persia.--EDS.]

No. XXI.—OCCURRENCE OF THE FALCATED TEAL (*EUNETTA FALCATA*) IN THE UPPER CHINDWIN.

Whilst shooting duck at Thazi Jheel, about 50 miles north of Kindat, on February 10th, 1914, I obtained a fine male of the above species, the skin of which was sent to the Society's museum. The bird was flying by itself but was following close behind a pack of male pintail which I had had put up, and with which it had presumably been feeding. I am inclined to think, however, that there were other falcated teal on the jheel earlier in the morning, as I saw a small pack of about a dozen ducks which I could not identify (they passed twice out of shot) and in size and flight they very much resembled the specimen obtained. I may here note that the male *E. falcata* previously obtained by me at the adjoining Kaya Jheel was shot on January 15th, 1906, and not in March as stated in Stuart Baker's book on the "Indian Ducks." During two seasons (1911 and 1912), shooting on most of the jheels in the Lower Chindwin and Sagaing districts, I failed to meet with *E. falcata*, and the only other specimen I ever shot was a solitary female in Aracan, either in 1908 or 1909, the date I think I recorded in my list of Aracan birds, published in the Society's Journal, p. 1220, Vol. XXI.

CYRIL HOPWOOD, I.F.S.

KINDAT, *8th May* 1914.

No. XXII.—A NOTE ON THE NESTING OF SOME BIRDS FOUND IN THE MULTAN DISTRICT.

THE GREY-BACKED WARBLER. (*Aedon familiaris.*)

The nidification of this species has not so far as I can find out been recorded in India, so it may be of interest to ornithologists to know that it is one of the commonest birds in the Multan and Montgomery "Bars" during the months of May and June.

I first noticed the bird at Kamalia near the border of Lyallpur and Multan districts during May 1912, but could find no nests. Later on the same month in the same locality I took two nests containing 3 and 4 eggs respectively. During 1913 and 1914, I found the bird common in almost every part of the jungle in Multan and took numerous nests. The jungle as found in Multan and Montgomery is not jungle as generally known, it is really bush scrub, the bushes being Jand, Van or Jal and Karil or wild caper, I cannot at present recall their scientific names. The soil is in some places sandy, sometimes rising in regular ranges of sand hills some 60′ or 70′ high, but for the most part it is as flat as a billiard table. In other places it is what is known as "put", a rich loam, on which excellent crops are grown in the parts brought under cultivation. The Jal and Jand occasionally grow into trees of considerable size but as a rule they only average some 15′ or 20′ in height. It is in jungles such as the above that the Grey-backed Warbler is to be found and I have taken its nests in all three of the above mentioned bushes.

In the Jal the branches of which as a rule droop towards the ground the nest is usually to be found placed between two or three thick branches when they cross one another, in the Jand and Karil generally up against the trunk of the tree resting on a thickish branch. I have never seen a nest over 5′ from the ground.

An interesting feature as regards the nidification is the different types of nest one finds. In the Jand the nest is small and compact, in the Jal and Karil large and loosely put together. From this I strongly suspect that advantage is often taken of a deserted nest of *Molpastes leucotis* as his bird almost invariably builds in Jand trees in this locality and the nests are exactly alike. In Karil bushes the nest always resembles that of *Argya caudata* which commonly builds in this bush, while in the Jal, the nest is a large loose structure quite different from the other two and this type of nest I take to be the work of *A. familiaris* himself as no other bird with the exception of doves breed in the bushes. Of course it may be that the bird suits its type of nest to the bush it builds in, but I do not think so. On one occasion I found a nest in a Jal bush containing one egg placed on top of another nest also containing one egg, addled. Mr. Cumming of the Quetta Museum tells me he has found this bird in Persia breeding in small date palms and in holes in walls but so far in Multan I have only found it in the above mentioned trees, indeed in the areas in which dates are grown it is entirely absent. Four eggs in the largest clutch I have found three appearing to be the usual number, which are of the grey type, none of the red type so far having been found.

The Long-tailed Grass Warbler. (*Laticilla burnesi.*)

Common in Multan in the tamarish jungles along the Chenab and breeds during April and May. Nests situated right at the bottom of thick clumps of tall grass and difficult to find.

Syke's Tree-Warbler. (*Hypolais rama.*)

Common in Multan along the banks of the Chenab and breeds in the clumps of grass of which vernacular pens are made, I forget its name. This grass is cut every year at a height of 2′-6″ or so from the ground and the nests are situated in the middle of these, 18″ or so from the ground. They are very easy to find as the bird if sitting leaves the tuft at once if it is tapped with a stick in passing. The nest is cup-shaped with rather a long conical foundation to give it stability I suppose amongst the grass stems, as it does not appear to be attached to the grass in any way. I found this bird

breeding in Quetta in rose bushes in July this year when I came up, one nest I found as late as 20th July. It appears to leave Multan at the beginning of May and for a week or so before leaving invades Cantonments in considerable numbers.

The nests in Quetta I noticed were not nearly so elongated as the type built in grass in Multan. Clutch 3 or 4, commonly 3.

INDIAN BUSH-CHAT. (*Pratincola maura.*)

Eggs taken on 24th April 1913 in Multan on the banks of the Chenab. Bird (in immature plumage) shot and identified by Mr. E. C. Stuart Baker. During April and May 1914, I saw several pairs evidently breeding but could not find nests. I also saw several fledglings accompanied by parent birds. A number of these birds appear to breed in immature plumage as I have seen them on more than one occasion evidently with nests or young found by their behaviour.

THE DESERT-LARK. (*Alæmon desertorum.*)

Nest and eggs together with male bird brought to me on the 19th April 1914. The nest was situated in a Lana bush about 6″ from the ground. Personally I have not met with this bird in this district and so far I know of only one other case of its having been met with. It appears to build both on the ground and in low bushes.

THE GULL-BILLED TERN. (*Sterna angelica.*)

This tern together with *S. seena, S. melanogaster and S. minuta* are found in about equal numbers breeding on the Chenab at Multan.

I took one clutch of eggs on 20th April 1913, the earliest date I have on record. As a rule complete clutches are not found till about 8th May. Hume was evidently too early on 28th April, *vide* "*Fauna of British India,*" Vol. IV, p. 312. The other terns breed rather earlier than this species, *S. melanogaster* earliest of all. The nest of *S. angelica* is the usual depression in the sand. The eggs differ a good deal in colour and markings, those of the same clutch even being often totally different. The size and markings are however quite distinctive and they are always easily recognisable.

J. LINDSAY SMITH, MAJOR, M.B.O.U., I.A.

QUETTA, *3rd August* 1914.

No. XXIII.—SMALL GAME SHOOTING IN SYLHET.

The shooting season of 1913-14 in Sylhet was a long one. Pintail snipe were in in the second week of August. The first to be shot that I have heard of was obtained on the 11th of that month. I saw many and shot seven on the 24th. In April there was a large immigration of these birds. Two parties obtained 166 birds to five guns on the 18th April. I shot my last bird on the 1st of May and my assistant saw two on the 2nd. I went over the favourite grounds with a spaniel on the 3rd and there was not a bird to be seen. Some of these late pintail snipe were extraordinary in size. I shot five on the 25th April in the Chargola valley which weighed one pound twelve ounces and two of them were very much larger than the others. They were mistaken for pigeons when they were first brought to table. These birds had each 26 tail feathers.

The season for fantail (or common) snipe was a poor one. At no time during the season were the birds really numerous. I obtained my first specimen on the 2nd October, a normal date here, and two belated individuals on the 14th and 26th April respectively. This last bird was shot near Chargola and was identified by Mr. R. B. Bather as well as by myself. The other 28 birds obtained that day were pintails.

There was a great scarcity of jungle fowl in many places. As in these localities no young birds were obtained the theory is held that the early floods destroyed the young broods and nests. In places where conditions were more favourable "murghies" were very numerous. One tea planter shot about 100 on his estate. I only shot three, all old cocks.

Kalij Pheasants seemed pretty numerous in likely places and I obtained two *Polyplectron* Pheasants and could have had more if I had wanted them.

Hill Partridges were common but Marsh Partridges seemed to have suffered from the floods and were hard to find. I saw a very small partridge in bamboo jungle which was new to me.

I got the first golden plovers on the 7th of September, shot some on the 21st of April, and saw a large company of them on the 26th April.

Woodcocks were fairly plentiful in January and about a dozen were obtained, not more than 100 feet above sea level.

Jack snipe were scarce.

Wood Snipe were said to have been obtained at Marcoli but as they were not identified by any authority the record is not reliable. They were said to have been walked up in heavy cover. I went over the ground with a spaniel but could find nothing but painted snipe.

I shot a green pigeon, which was alone, with a rosy mauve breast which was new to me.

I obtained the following species of waterfowl:—Pintail duck, spotbill, gadwall, shoveller, red-headed pochard, golden-eye, white-eye, garganey teal, common teal, cotton teal, large whistling teal, common whistling teal. and I saw two species (at least) of geese and some Brahmini Ducks without obtaining any. I saw teal in August but did not record the date.

I saw garganeys on the 19th April and also two larger ducks too distant to identify with certainty. Shikaries reported teal on April 29th.

Altogether I shot 22 species of game birds.

W. VAL WESTON.

Prithimpassa, Sylhet, Assam, *May* 1914.

No. XXIV.—THE CHINESE FRANCOLIN (*FRANCOLINUS CHINENSIS*) IN MANIPUR DISTRICT.

A few days ago, while on tour in the extreme south-east of Manipur valley, I heard the Chinese Francolin (*Francolinus chinensis*) calling all over the foot hills in a small valley leading south out of the main valley, about two miles south of the village of Pallel. There were also large numbers of the black Partridge (*Francolinus vulgaris*) calling all over the hills and the valley. This is the common partridge of the Manipur valley. That the bird I heard was the Chinese Francolin I am certain, as I had just returned from a tour down the Kabaw Valley in Burma where I shot a cock for the purpose of identification of the species, which is exceedingly common there, and which I had never seen previously. I identified the bird from the descriptions given "The Game Birds of India and Asia" (Finn), "Game, Shore, and Water Birds of India" (Le Messurier) and the "Game Birds of

India, Burmah and Ceylon" (Hume and Marshall), so I think there can be no doubt that my identification is correct. My reason for writing is that none of these authorities give Manipur in the range of this species, and it may be of interest to your readers to know that it occurs there. I endeavoured to shoot one of the cocks I heard calling in order to verify the fact of its being the Chinese Francolin, but was unable to put one up, as the scrub jungle was too thick. But the peculiar call (which one of Hume's correspondents so aptly renders "kuk kuk kuich ka-ka") makes it impossible that I could have been mistaken, especially as the Nagas and Manipuris, who were with me, told me that the bird was the Kabaw urengbi (Kawab partridge). They told me that the bird was not uncommon in the south of the Manipur Valley and could be heard frequently in the neighbourhood of Meirang, a village in the south-west of the valley.

J. C. HIGGINS, I.C.S.

IMPHAL, MANIPUR STATE, 29*th May* 1914.

No. XXV.—THE GHARIAL (*GAVIALIS GANGETICUS*).

Last year (March 1913) while shooting at Ferozpore in the River Sutlej I shot a crocodile (*Gavialis gangeticus*). It was a splendid female specimen, its measurements are as follows:—

Length from the point of the snout to the end of the tail..	9 feet 7 inches.
Girth round the abdomen	3 feet 2 inches.

Skull—2 feet 3 inches long with 88 teeth on each side.

The animal was lying on the river bank basking in the sun; it was unusually quiet, due, as was afterwards found, to two bullet wounds previously caused. One of the bullets had broken the skull (the right auditory capsule and the squamosal bone along with the quadrate), and the second one the backbone; the wounds appeared to be some days old and were choked with sand yet they had not proved of a fatal nature. The animal was shot underneath the right armpit, the bullet passing through the lungs pierced the heart but did not come out of the body on the other side.

On being dissected it was found that the belly was filled with the very much coiled and enlarged oviducts which were full of eggs. The right one contained 32 complete eggs in the lower part and a large number of unripe ones in all stages, round some the yolk was being secreted and round other the shell-membranes had been formed but the shell was not yet formed. The left oviduct contained 24 complete eggs. The shell in these complete eggs also was not quite perfect, in some there was a hole at one point or another, while in others a very thin calcareous layer had been secreted to complete the gap.

The measurements of an egg are as follows:—

Length 3·6 inches; breadth 2·8 inches at its widest point.

The shell is rather rough and of a white colour. The shell membrane is very tough, and forms a perfect bag round the contents; in some cases where the shell was removed it was seen that the shell membrane was of an oval appearance, though perfectly flat at one end.

The air space in the egg is rather large, in some it was more than one-third of the whole egg.

A dozen eggs were kept in sand to see whether any development took place but with no success. The skull of the Gharial has been kept in the museum of the Government College, Lahore, and an egg has been sent to the Society's Museum.

BAINI PARSHAD, B.SC.

GOVERNMENT COLLEGE, LAHORE, *May* 1914.

No. XXVI.—EXTENSION OF RANGE OF THE CHAMELEON.

The range of *Chamaeleon calcaratus* as given by Boulenger in the Reptilia and Batrachia Volume of the *Fauna of British India*, page 232, is "Wooded districts of Peninsular India, south of the Gangetic plain, and Ceylon", whilst I have frequently come across it at Lahore, Ferozepore, Ludhiana, Ambala, Jullundur, Mardan, Peshawar. They are often seen on the trees. The range of this animal will therefore have to be extended, the Punjab being added to the above given range.

BAINI PARSHAD, B.SC.,
Alfred Patiala Research Scholar.

GOVERNMENT COLLEGE,
LAHORE, 22n*d May* 1914.

No. XXVII.—NOTE ON THE SPINY TAILED LIZARD (*UROMASTRIX HARDWICKII*).

I am sending by registered parcel post a specimen of *Uromastrix hardwickii* (Gray) preserved in spirit. The reptile was taken from its burrow in March 1914 in the Forest of Kala Shah Kaku. It was hibernating at the time, being quite unconscious and was brought to Lahore in the same state. On being warmed a little, the reptile became active though only for a short time, when, owing to the low temperature, it again became quite senseless. It was kept in a cage for some time, and then killed by chloroform.

The abdomen was opened to let the spirit penetrate. Its very large and well developed fat body of a yellowish colour can be easily seen.

This lizard is quite common in the Punjab, especially in sandy regions. I have often seen it in Lahore and its vicinity in Ferozepore, in Ludhiana, Gujranwala and Kala Shah Kaku.

In this part of India the lizard is known as *Salma* and is much valued for the oil in the fat gland which is used as an embrocation.

Moreover, curious as it may seem, the whole lizard, while in a state of hibernation, is given to horses to eat. It is considered that this renders them stronger and more hardy.

BAINI PARSHAD, B. SC.,
Alfred Patiala Research Scholar.

LAHORE, 25*th May* 1914.

No. XXVIII.—NOTE ON *ERYX CONICUS.*

In Major Wall's article on *Eryx conicus* in Vol. XXI, p. 2, he mentions a case of this snake killing a lizard but making no attempt to eat it. A few mornings ago I watched a *conicus* with a large garden lizard round which it had coiled itself. Unfortunately I did not see the beginning of the encounter, for undoubtedly there had been a fierce struggle before the snake had got its coils round the lizard, and thus rendered it more or less helpless. The snake had been severely bitten in three places, all of which were bleeding, and one bite was so deep that a part of its bowels were protruding. It was most interesting to watch how the snake avoided the sharp spines on the lizard's back, but it had a cruel grip round the lower part of the body and hind legs, and was doing its best to swallow one of its legs, but it was eventually obliged to disgorge this. It then tried to get at the lizard's head, but here it met its match, for unfortunately for itself the snake brought its neck within reach of its victim's jaws which promptly closed on it, biting viciously. The snake after one or two attempts to get the spiky head into its mouth, suddenly relaxed its coils, and the lizard shot away, with a broken leg. As far as I could see, in spite of the well known squeezing powers of *Eryx conicus* no other damage had been done to the lizard. While I was examining the lizard the snake, much to my regret, crawled into a hole. *Eryx conicus* is quite common here, but in Gya, where I examined many snakes, I never saw one. A friend here told me that he came across a brown snake devouring a squirrel the other morning, and from his description it could only be *Eryx johnii*. Personally during the two and a half years I have been in this district I have never seen one of these snakes.

FLORENCE POWELL.

GHAZIPUR, U. P., 16*th July* 1914.

No. XXIX.—EARTH SNAKE ATTACKING A MYNA.

On the 2nd July I witnessed an attack made by an Earth snake (*Eryx conicus*) on a Myna (*Acridotheres tristis*). My attention was attracted to the scene by the clamour raised by several Mynas and other small birds about the roots of a Nim tree (*Azadirachta indica*), close to my garden gate.

On approaching the spot I found the matter was somewhat serious. The crowd of birds melted away and disclosed a hapless Myna in the coils of an Earth snake. The snake had coiled itself once round the bird's body and had gripped its breast with its jaws. The wretched Myna uttered feeble squeaks now and again, but the snake remained perfectly immovable, except perhaps for an almost imperceptible tightening of its coil round the body

I should have liked to have watched the tragedy to its close, but the cries of the Myna. its acute distress, the mute appeal in its eyes were deciding factors in the case and, I determined to save it, if possible. A blow with my stick was out of the question, as that would have harmed the bird as well as the snake, so I touched the snake gently with the point of my cane on the underjaw. This had the desired effect. The snake let go and rapidly withdrew its head at the same time loosening its coil. The Myna extricated itself in a second and darted off with a cry of relief. The snake showed no signs of fear and made no attempt to escape. I killed it with a blow or two of my cane. About one-third of its body was still in the hole from which it had emerged to capture the Myna. From this I conclude that the snake made a spring on the Myna from the entrance of its hole. I did not see the actual attack and cannot say whether the bird was first seized in the snake's jaws, but it seems to me that is what must have

occurred. From the positions of the snake and the bird it appears probable that the snake hurled itself at the bird, seized it by the chest and rolled it over coiling itself round it as it did so.

This is the third time I have found *Eryx conicus* attacking birds. On the two other occasions they were in the first instance a hoopoe (*Upupa epops*) and in the second a babbler (*Crateropus canorus*). In both these cases the snake had succeeded in killing the bird. *Eryx conicus* evidently lives partly on ground feeding birds.

G. A. LEVETT-YEATS, I.S.O.

GHAZIPUR, U. P., 19*th July* 1914.

No. XXX.—ON THE BREEDING HABITS OF *ERYX CONICUS*.

A snake was killed in the Prison Garden a few days ago, on the 10th of June, in the morning, and whilst a convict was bringing it to the gate from the garden (about 200 yards), he saw a young one coming through the vent opening of the snake. He pulled it out and he saw another in the opening and pulled that out too, till five young ones were pulled out. They were all dead, the convict says, and showed no movement when brought out. The snake on being seen turned out to be a typical *Eryx conicus*, 28 inches long with a 2″ tail, and the young ones measured 7 inches to 8 inches. The snake was dissected and three mature young ones were seen lying inside, one near the vent opening. I could not make out any eggs. Being a viviparous snake, it was stitched up leaving the young ones *in situ* just as they were without moving them, so that it could be sent on to you as it was.

Major Wall has an article on *Eryx conicus* in the Society Journal, Vol. XXI, No. 1 (31st October 1911).

There he has said that it is not known whether the snake is oviparous or viviparous and that he had found eggs in a gravid female killed in December. This specimen is certainly viviparous and interesting in that it may help in the knowledge of the breeding of the species.

I will forward the snake to you in a few days as soon as it is well preserved in spirit.

K. G. GHARPUREY, CAPT., I.M.S.

DHULIA, W. KHANDESH,
14*th June* 1914.

No. XXXI.—A REMARKABLE SPECIMEN OF THE WART SNAKE, *CHERSYDRUS GRANULATUS*.

A fine example of this curious snake has been recently acquired by our Society from Bangkok, Siam. Mr. Boulenger in his Catalogue gives the length of the species as 1,000 millimeters (39 inches). The specimen now referred to measures 4 feet 4 inches, has a maximum girth of $7\frac{1}{4}$ inches, and weighs 4 pounds! Such a fine specimen gives one special facilities for studying its very curious scales. These are much broader than long, and about 160 in the neck, and about 138 at the greatest girth. Each scale is diamond-shaped, and presents three strong keels, which end in free points posteriorly. The median keel is the most prominent. None reach the edge of the scales either basally or terminally. These keels give a very harsh rasp-like feel to the skin. There are no enlarged shields on the head, the only modified shields being a horseshoe like rostral, and quoit-like shield around each nostril. There is no enlarged anal shield. The anus is a some what rectangular aperture. The teeth in the maxilla number 22.

F. WALL, MAJOR, I.M.S., F.L.S.

ALMORA, U.P., *June* 1914.

No. XXXII.—THE SEA-SNAKE, *HYDROPHIS CÆRULESCENS* (Shaw.).

A CORRECTION.

In Volume XXII of this Journal, page 63[illegible], I remarked upon a melanotic specimen of the sea-snake *Hydrophis torquatus* (Günther). Since examining this snake I have had an opportunity of investigating all the sea-snakes in the Indian Museum and in our Society's collection, I find the numbers of the teeth behind the fangs in the maxilla are of the greatest assistance in identifying these snakes, especially many species that have a very similar range of costal rows and ventral shields.

I have re-examined the snake referred to and can now very positively correct my previous identification. The snake is without doubt Shaw's *cærulescens*. I find that the teeth in the maxilla number 15, the usual number in this species. I have examined the jaws of some 20 specimens and find these teeth vary from 13 dubiously in one specimen to 17. In 20 other species of *Hydrophis* I find there are from 10 to 12 teeth in two species and from 1 to 10 in all the rest. In *torquatus* (Günther), *vel diadema* (Günther) there are 8 to 10. In addition I find that the parietal shields in this specimen do not touch the postoculars on either side, a feature I drew attention to in my monograph of the sea-snakes and mentioned as quite peculiar to this species. This escaped my notice when I first examined the specimen, or I would not have fallen into error.

F. WALL, MAJOR, C.M.Z.S., F.L.S., I.M.S.

ALMORA, 16*th July* 1914.

No. XXXIII.—A CASE OF CANNIBALISM BY *BUNGARUS CÆRULEUS*.

A large krait was killed at dawn; when I first saw it I thought it had eggs inside, later when I came back from shooting, hours afterwards, on further examination I found that it had swallowed another snake which on extraction proved to be another krait. I regret I was unable to save the snakes entire; so I sent the heads in Boric Lotion for maceration, etc. The big snake was killed in a Marna Field.—

The measurements were as follows:—

	B. cæruleus. ♀ (The Host).	*B. cæruleus*. ♀ (The Guest).
Length	3′-10½″	3′-3″
„ of Tail	6⅛″	5″
„ 1st complete white band from nose ..	1′-0	1′-1″
Anterior, M. B. & P. ..	15	15
Ventrals	215	211
Subcaudals	54	52
„ and anal ..	Entire	Entire
Weight	9 oz.	6 oz.

I fancy the host was killed almost immediately after accommodating the guest, practically no damage from digestion. The guest was just about to cast its skin. Guest was swallowed head first and nose of guest was 4½ inches from host's vent.

O. A. SMITH, MAJOR.

HAZARIBAGH DISTRICT, *August* 1914.

[In Major Wall's article on the krait (A popular treatise on the Common Snakes of India) at p. 720, Vol. XVIII, it will be seen that the food of kraits consist almost exclusively of other snakes.—EDS.]

No. XXXIV.—REMARKS ON THE SEA-SNAKES IN OUR SOCIETY'S COLLECTION.

With 2 Plates.

I have lately examined all the species of the sub-family *Hydrophiniæ* in our Society's Collection, which are as follows:—

Hydrus platurus (Linnè).

Represented by ten specimens, six of which are small, and not in a very good state. All are from Madras, or the neighbourhood of Bombay, the smallest measure $10\frac{3}{8}$ and $11\frac{3}{8}$ inches respectively. In six specimens examined the post-maxillary teeth are 8 in one, 9 in three, and 10 in two. The supralabials and temporals are subject to great variation. Most of these specimens belong to "variety" *bicolor* (Schneider), and one such appears to be an albino, the dorsal band being hardly discernible. The lower margin of the dorsal band is festooned behind in one, and this may be considered a transitional form approaching "variety" *maculata* (Jan). One from Bombay exhibits a series of subcostal spots behind, thus agreeing with the "variety" C of Mr. Boulenger's Catalogue.

Figs. 1 and 2 show two variations. In 1, I think, the long shield beneath the eye is formed by a confluence of the upper parts of the 4th, 5th and 6th labials. In Fig. 2 similarly the shield beneath the eye seems to me formed by a confluence of the 4th and 5th. The upper part of the 6th failing to blend with them.

Hydrophis cærulescens (Shaw).

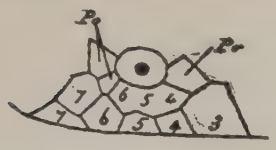
There are six good specimens, all adult. One of these is from Madras and the rest from the coast about Bombay. All are typically rough from the strong keels on the scales. The teeth in the maxilla are usually 14, in one 13.

Hydrophis mamillaris (Daudin).

Four adult specimens of this rare species are to be found on our Society's shelves, and all in excellent preservation. There are usually 4, sometimes 5 entire labials. The 5th and 6th re usually divided or sometimes the 6th only, and rarely the upper part of the 6th is confluent with the temporal. The neck is one-third or less than one-third the deepest part of the body behind in all the specimens, and in the gravid female nearer one-fourth. The gravid female (unfortunately without any record date of capture) measuring 2 feet $8\frac{3}{4}$ inches, contained three fœtuses, and a small infertile egg. The fœtuses, all females, are perfectly formed, and obviously would have been very shortly born. They measure from 12 to $12\frac{1}{8}$ inches. The head in all is quite black, and the black bands vary from 43 to 56. The bands in most are complete and discrete or thinly connected below along the ventral shields behind. At midcosta they are as broad or broader than the spaces. In the largest specimen the bands are obsolete subcostally and converted into cross-bars. The teeth in the maxilla are 9 or 10. Fig. 3 shows the usual arrangement of shields. Fig. 4 (the right side of the same specimen as fig. 3) shows the upper part of the 6th labial confluent with the temporal. Fig. 5 shows a confluence between the lower postocular and the upper part of the 5th labial.

Hydrophis coronatus (Gunther).

Two well grown adult specimens are included in the collection, both from Karwar. They are very typical of the species, which for a marine form shows unusual constancy in the arrangement of its head shields. The teeth in the maxilla are 5 in both examples.



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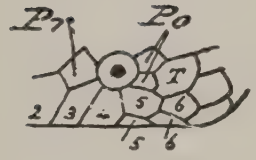
Hydrus platurus



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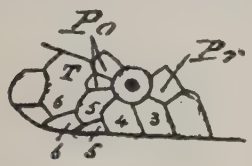

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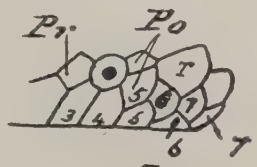

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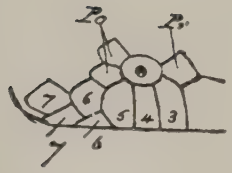
Hydrophis mamillaris



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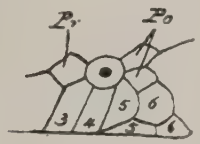

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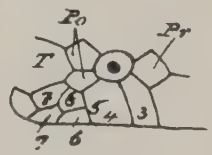

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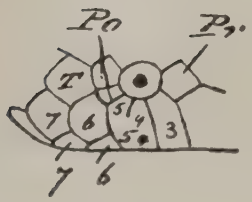

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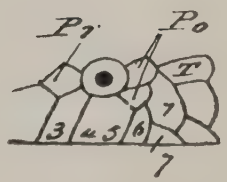

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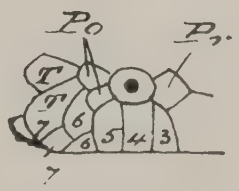

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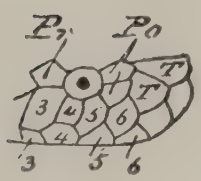

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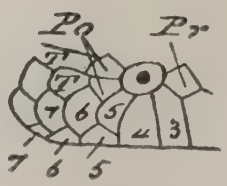

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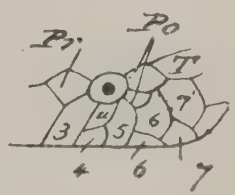

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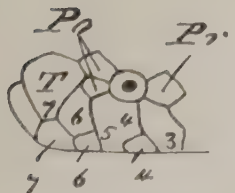

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Hydrophis cyanocinctus

Lepidosis of *Hydrus platurus*, *Hydrophis mamillaris* and *H. cyanocinctus*.

Hydrophis gracilis (Shaw).

This common species is rather poorly represented. There are but six specimens, of which one young one is shrivelled and another young one sodden. There are three good adults, the largest 2 feet 10 inches long: the smallest specimen measures 13 inches. The head shields show remarkable constancy in their detail. The post-maxillary teeth are usually 5, in one example 6.

Hydrophis cantoris (Gunther).

Not well represented though such a common snake. There is no large specimen. The head shields are very constant except in the case of No. 841, where the præfrontals are confluent with the supraoculars. The teeth in the maxilla usually 5, are in one example 6.

Hydrophis fasciatus (Schneider).

There are only two representatives of this common snake, both from Madras, and it would appear to be far less common on the Malabar Coast than the Coromandel. Both are adults, the largest 2′ feet 9¼ inches in length, and one is specially interesting in that it is a gravid female, but unfortunately there is no record of the date of its capture. It measures 2 feet 7 inches. Only two embryos imperfectly developed were found in abdomina." The postmaxillary teeth are 5 in both specimens.

Hydrophis ornatus (Grey).

There are two specimens only of this uncommon snake, one Indian and one from the Loo Choo Islands. The 5th and 6th labials are divided in both. One specimen is a gravid female (date of capture not known), and this contained 3 eggs with no trace of embryos within. One has 40 and the other 48 dorsal bars fading about midcosta. The maxillary teeth are 10 in one example, 11 in the other.

Hydrophis brugmansi (Boie).

This common species is but poorly represented, there being but six specimens, one of which is shrivelled. The black bands from 36 to 44 in number, dilate vertebrally, and in the older specimens fade about midcosta to a much lighter hue, still being apparent however. Costally they are half or even less than half the intervals, and in one specimen there is an almost perfect series of vertebral spots in the spaces [*spiralis* (Shaw)]. In most of the specimens the very deep temporal comes to the border of the lip, in other words is confluent with the 6th labial. A distinct but small 6th labial is present in three specimens on one or both sides. The maxillary teeth, usually 7 in number, are 6 in one example.

Hydrophis cyanocinctus (Daudin).

There are 15 specimens of this very common snake. One of these (No. 851) is specially interesting, in that it is a gravid female, but no record of its date of capture is available. It measures 4 feet 4 inches, and contained 9 fœtuses, seemingly ready to be born, which I extracted. Four of these are males and five females, and they vary from 12 to 13 inches in length. The arrangement of the labials, postoculars and temporals is subject to great variation in this species, as is exemplified by the figures produced. There are usually 5 entire labials, the 3rd, 4th and 5th bordering the eye. I regard the 6th and 7th as divided into an upper and lower

part, just as one sees other labials preceding them divided in some specimens. (*Vide* figures.) In all the fœtuses the bands (55 to 68 in number) are complete. The first 2 to 5 bands are confluent ventrally, the succeeding ones discrete. All are somewhat dilated vertebrally, and about the same width as the spaces at midcosta. In some a light horse-shoe is more or less distinct on the head, passing anteriorly across the præfrontals, and posteriorly over the eye through the temporal region. In the adults the bands taper ventrally or fade at about midcosta, but though the black fades the bands are usually more or less discernible as such. The post maxillary teeth are usually 7 in number, sometimes 6, and in one example 8.

Figs. 6 to 11 inclusive are taken from the fœtuses extracted from No. 861 and are specially interesting on this account. The parent has the head-shields on both sides arranged as in fig. 13. Fig. 6 shows the normal shielding of this species, the first 5 labials entire, the 6th and 7th divided, and the 3rd, 4th and 5th bordering the eye. Fig. 7 shows a divided 5th labial. Fig. 8 shows a confluence of the usual 4th and 5th labials. In fig. 9 the lower parts of the 4th and 5th labials are united. Fig. 10 shows confluent 4th and 5th labials and an entire 6th labial. In fig. 11 the 3rd labial fails to touch the eye, and the upper part of the 7th is confluent with a lower temporal. Fig. 12 has all the labials from the 3rd divided, and fig. 13 (the right side of the same specimen) has the 5th divided, but not the 3rd or 4th. In fig. 14 the 3rd and 5th labials are entire, but not the 4th. Fig. 15 shows a confluence between the upper part of the 4th, and an entire 5th labial. The upper part of the 7th is joined with a lower temporal.

As a result of many years' special study of the *Hydrophiinæ*, I find I can only recognise as distinct with certainty those species from the Indian seas that are enumerated.

Hydrophis jerdoni (Gray).

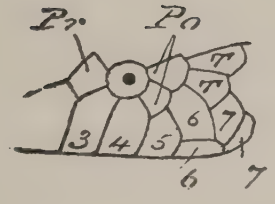
Two specimens, one adult and one young, are the only representatives of this species. The temporal is confluent with the 6th labial as is usual, and the labials are all entire. The postmaxillary teeth number 9 in the adult.

Enhydris curtus (Shaw).

There are 11 examples, the longest measuring 2 feet 8 inches. Most are juvenile and one in a bad state of preservation. The same variation in the labials, postoculars and temporals that one sees in *E. valakadyn* and *H. cyanocinctus* is also very marked in this species. The anterior 4 or 5 labials are usually entire, and the 3rd and 4th usually border the eye. In one young specimen the bands are complete, but in the others the bands are replaced by bars that disappear about half, or two-thirds down the side of the body. In adults the bars are less distinct, and less defined. The post-maxillary teeth are usually 5 in number, less commonly 4 or 3. Fig. 16 shows the normal arrangement of shields. Fig. 17 (the right side of the same specimen) shows a divided 4 labial and the upper part of the 7th labial confluent with the lower temporal. Fig. 18 shows a complete confluence of the 3rd and 4th labials and a confluence of the lower part of the 6th labial with the 5th labial. The postoculars are also confluent.

Enhydrina valakadyn (Boie).

Of the 13 representatives the two largest (both females) measure 3 feet 11 inches and 4 feet 3½ inches. The latter has a girth of 6½ inches. The postoculars, labials and temporals present very great variations. The sublinguals are poorly developed, and when recognisable as such are separated



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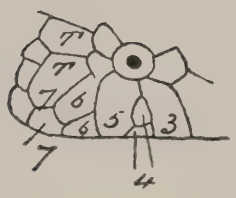

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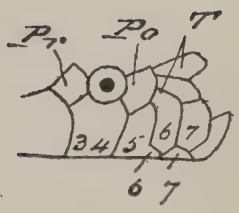

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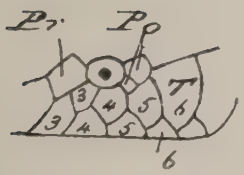
Enhydris curtus



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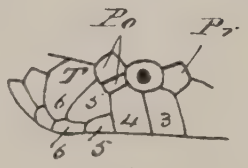

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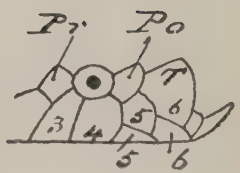

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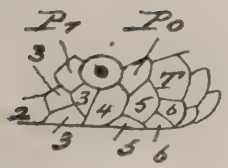

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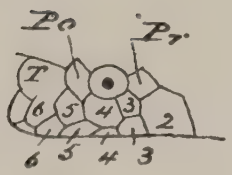

23

Enhydrina valakadyn.

Lepidosis of *Enhydris curtus* and *valakadyn*.

by several small scales. The ventrals too are poorly developed, and often divided, but can usually be recognised as such. The postmaxillary teeth are usually 3, rarely 2 or 4. Figs. 19 and 20 are from the same specimen. In fig. 19 all the labials from the 3rd are divided, and the upper part of the 6th is confluent with the temporal. In fig. 20 the 3rd and 4th labials are normal and entire. Fig. 21 shows the same confluence of the temporal and 6th labial as the last specimen with, in addition, a confluence of the postoculars. In fig. 22 the labial is divided into three parts, the 4th is entire, and both parts of the 6th complete. Fig. 23 (from the same specimen as fig. 22) has the 3rd and 4th labials divided, and the upper part of the 6th partly confluent with the temporal. On both sides the postoculars are united.

PLATURUS LATICAUDATUS (Linnè).

The solitary specimen is from the Loo Choo Islands. It appears to be a very rare snake in Indian waters, the only Indian records I know of being the specimen in the Indian Museum from Tolly's Nullah, Calcutta, recorded by Sclater, and figured by Fayrer in his Thanatophidia (Plate XIX); and the specimen in the British Museum presented by General Hardwicke labelled "Bengal."

The specimen is very typical. The costals two headslengths behind the head are 19, in midbody 19, and two headslengths before the vent 17. In the reduction from 19 rows to 17, the 2nd and 3rd above the ventrals coalesce.

The ventrals are 241, anal divided, and subcaudals 40. The maxilla holds a single (dubiously 2) tooth.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, *July* 1914.

No. XXXV.—OCCURRENCE OF THE SNAKE *MELANOPHIDIUM PUNCTATUM* IN THE WESTERN GHATS.

An interesting and valuable addition to our Society's reptile collection is a specimen of *Melanophidium punctatum* taken by Mr. S. H. Prater at Talwadi on the Goanese Frontier, a locality which extends its previously known habitat. The snake is rare. There are six specimens in the British Museum, all from the Travancore Hills, and I have had one from the Anamallays. It has never been recorded before north of the gap in the mountainous chain which occurs at Palghat. The scale rows two headslengths behind the head are 13, at midbody 15, and two headslengths before the vent 13. The ventrals are 197 and subcaudals 11 pairs. The specimen is very typical.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, 16*th May* 1914.

No. XXXVI.—NOTES ON A GRAVID *ECHIS CARINATA*.

A specimen of this snake recently sent me from Lahore proved to be gravid. It was killed on the 18th June, and measured one foot two inches. In the abdomen were four fœtuses in membrane, seemingly ready to be born. It was in an advanced state of putrefaction, and the one fœtus capable of measurement was $5\frac{1}{2}$ inches long.

The snake is further interesting, in that it bit a cooly in the ankle, and caused his death 12 hours later, a remarkably brief interval for a fatality in this species.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, *4th July* 1914.

No. XXXVII.—RECOVERY FROM BITE OF *ECHIS CARINATA*.

A large snake bit a native plough-boy in my presence making two distinct punctures on his ankle. I bound a puggri round the boy's leg as a ligature and sent him to my Veterinary Hospital which was only a few hundred yards off, where the wounds were treated with Pot. Permanganate.

Later my head blacksmith, who is the local snake doctor, gave the boy medicine (the root of some tree, dried, rubbed into a powder and mixed with water).

The boy, while under my treatment, expected to die at any minute, but immediately after swallowing the local decoction he declared himself much better.

He was bitten on the 20th, and except for a local swelling is all right now. He never showed any symptoms of any systemic disturbance.

I daresay the snake was harmless, as I know nothing of snakes. The natives give the snake a fairly bad reputation, but they always say practically all snakes are poisonous, so that does not go far much.

HISSAR, PUNJAB,
24th August 1914.

R. BRANFORD,

[The snake sent for identification proved to be a large specimen of *Echis carinata*. measuring 22½ inches in length—EDS.]

No. XXXVIII.—A GRAVID *LACHESIS GRAMINEUS*.

I have lately received from the Andamans a specimen of this viper, killed at the latter end of May or early June, which contained twelve young apparently ready for discharge. The parent measured 2 feet 6 inches. Many of the young had been extracted, but three remained for me to examine. A ♂ measured 7¾ inches, and two ♀♀ were both 7⅞ inches long. In the parent the scale rows were 23 anteriorly and in midbody 17 behind. In the ♂ fœtus they were 21 in midbody and in both ♀ ♀ 23. The parent was almost uniform pale-brownish in colour, with indistinct greenish bars posteriorly. Fœtuses were dark-greenish with irregular light-brownish bands, most conspicuous posteriorly and a series of irregular white marks in the flanks.

F. WALL, C.M.Z.S., F.L.S.,
MAJOR, I.M.S.

ALMORA, *4th July* 1914.

No. XXXIX.—HABITS OF THE MASON-WASP.

A mason wasp built 5 cells in my box which she had closed and was at work on the 6th I removed them, in doing so I broke one and out of curiosity counted the number of small grey spiders it contained, there were 98! Unfortunately I had thrown away the other cells before counting the spiders, but imagine the labour not to mention the "death-roll" among

spiders. In the six cells there would have been something like 600 spiders.

It is evidently most unusual for them to store so many as in the first cell I examined—as I have examined some others since and one contained 15—some large and some small—whilst another contained only 3, but they were very large bodied spiders. A third cell examined had 11 spiders in it.

The speed at which they work is very great. A little after 10 o'clock one started to make her cell, when I looked again at 3-30 she had not only finished it but stored it and sealed up the entrance and it was quite dry. It contained 15 spiders.

F. FIELD.

Camp via Fyzabad,
August 1914.

[The mason-wasp, sent by Mr. Field, is *Sceliphron coromandelicum*.—Eds.]

No. XL.—NOTE ON TIGER-BEETLES FROM COORG.

The following Tiger-beetles (*Cicindelidæ*) amongst others as yet undetermined, were taken during a recent visit to Coorg in May 1914.

Cicindela viridicincta, Horn.—Quite common on one path at Pollibetta, South Coorg. Only recorded previously from Kanara and Nilgiris in Southern India and from Chota Nagpur. (Fowler, Faun. India Cicind., p. 328).

Cicindela duponti, Dej.—Two specimens from Pollibetta, where it was not common. A widely-distributed species. (Fowler, *l.c.*, p. 382.)

Cicindela hamiltoniana, Thoms.—Common on a path at Pollibetta. Previously recorded from Travancore, Mysore and the Nilgiris. Fowler (*l. c.*, *p.* 391-392) says that it is usually considered a very scarce insect and is evidently very local, and that it appears to be semi-arboreal in habits. That it is very local is evident from the fact that I only saw the species on one portion of a single path which passed between the secondary jungle which had grown up on an abandoned part of a Coffee Estate. The beetles, however, were only found on the ground, where they sat with head elevated at a considerable angle. They are alert and agile, as indeed might be guessed from the length of the slender legs which are well shown in Fowler's figure.

Cicindela hæmorrhoidalis, Wied.—Found on paths at and near Pollibetta, but by no means common. Very active and wary. A widely-distributed species. (Fowler, *l.c.*, pp. 402-403.)

Cicindela striolata, Ill.—Fairly common on paths, both in North and South Coorg; seems to exhibit a preference for shady paths. This is also a widely-distributed species. (Fowler, *l.c.*, pp. 419-421.)

T. BAINBRIGGE FLETCHER.

Pusa, Bihar, 22*nd July* 1914.

No. XLI.—NOTE ON CICADAS.

This insect comes out in thousands from the ground, at the bottom of a tree at Gangtok, elevation 6,000 feet. It emerges from a circular hole, there being no indication on the surface of the ground that there is a very large colony of them underneath, although year after year they emerge in countless numbers from the same plot of ground, soft yellow clay, with sand underneath, mixed with the yellow clay, covered with green slime and

moss, during the rains. As soon as the larva emergies it hurries for the nearest tree, piece of timber, or anything to which it may attach itself by its specially adhesive legs, if I may use the term ; for its legs once they grab on to anything, seem to drill themselves on to the surface, for it wants purchase, a good hold. Once having fixed itself firmly, the whole body seems to be in convulsions, it struggles and struggles, and presently the top of its head splits, and out of the puncture made a brightly yellow grub emerges, soft and with two white patches on either side of its body, these are its wings neatly and compactly folded. As soon as it is free from its shell it seems to vibrate and stretch out its wings like sails are unfurled, and it is surprising to see the hitherto white patches develop into lovely gauze wings, soft and gossamer like. These develop and oscillate at the same time, and within 30 minutes or a little more, the insect that came out of the ground is now a perfect flying creature, brown in colour with long wings, perfect in shape and size, and within an hour it has flown away, to join the thousands that have gone before it. After a few days all have gone, and only shells, with split heads, remain sticking by the thousand to the barks of all the trees, or twigs in close proximity to the orifices made in the ground through which they originally emerged.

They do not come out a few at a time, but when the sun is bright the whole underground family seem to make up its mind to come to the surface, and one follows the other, with clock-like regularity. Each one makes a hole for itself and does not use the one hole to come out, so the whole surface of the ground for yards all round is punctured with neatly drilled holes.

C. H. DRACOTT, C.E.,
State Engineer.

GANGTOK, SIKKIM, *27th July* 1914.

No. XLII.—THE RAMIFIED ROOTS OF *TRAPA BISPINOSA*, ROXB. (WATER-CHESTNUT.)

Professor E. Blatter, S. J., in a previous number* of this journal has discussed the morphology and anatomy of the organs of *Trapa bispinosa*, which are usually known as "pectinate organs." He calls them ramified leaves. He brings together a large number of opinions pronounced by different botanists on these bodies. Thus, Bentham and Hocken Baillon, Wight, C. B. Clarke and De Candolle have called them leave; Roxburgh and Trimens looked upon them as stipules, while finally Barneoud pronounced them to be roots. They are described as follows by Raimann.† :—

"Vielfach werden dem untergetauchten Stengelteil B. zugeschrieben, welche nach Art der Wasserranunkeln in haarformige Zipfel zerschlitzt and dabei einander gegenubergestellt sein sollen; diese Gebilde sind aber nichts anderes als Nebenwurzeln mit zahlreichen, 4 zelling angeordneten,

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* Volume XVII, pp. 84-88.

† Engler and Prantl. III.—VII., 225. I owe the following translation of the quotation in German to my friend Mr. S. L. Ajrekar.

Very often leaves are attributed to the part of the stem which is sunk under the water. These are supposed to be split into hairlike tips as in the case of aquatic Ranunculaceae and to be placed opposite one another. These structures are, however, nothing else than secondary roots with numerous simple, hairlike branches arranged in a 4-lined manner. They originate right and left from every leaf mark and appear, therefore to be standing opposite. Occasionally long and simple rootlets also arise in numbers from the same places.

K.R.T.

haardunnen, einfachen Verzweigungen ; sie entspringen rechts und links an eder Blattnarbe und erscheinen dadurch gegenstandig. Mitunter entvickeln sich an denselben Stellen auch einfache lange Wurzelfasern in Mehrzahl.

Professor Blatter objects to these bodies being called " Pectinate " organs. agree with him and I have here designated them as ramified roots instead. Root caps have been noticed by me in some rosettes. These caps tipped very ramification, and also the main axis. I further noticed that several imple or occasionally biramous roots also arose in some cases from the ame nodes which gave rise to the ramified organs.

Every node is provided with a simple undivided leaf of some kind or other. The ramified structures arise on either side of a leaf or a leaf scar rom the stem. Moreover in position and origin they agreed completely rom morphological as well as anatomical points of view with the other set of ndoubted ordinary simple roots.

Other plants have been known with dimorphic roots. Thus in the climbing Aroids there are the climbing roots and feeding roots both arising dventitiously from the stem. Nor are examples of roots with chlorophyll vanting, if we turn to the classes of Orchids and Lemnas. Finally, the formation of extensive net-works of roots by aquatics or semi-aquatics is a matter of common observation.*

In *Ipomoea aquatica* we get precisely a pair of such ramified roots restricted to the nodes and situated on either side of the leaf.

H. M. CHIBBER.

Agricultural College, Poona,
June 1914.

No. XLIII.—ON LEAF-FALL.

(*With a plate.*)

Kerner in his Natural History of Plants † has this interesting observation n fall of the leaf :—" It is also worthy of remark that in some trees the eaf-fall begins at the end of the branches and gradually proceeds towards he base, while in others the contrary is the case." Our local roadside rees afford interesting subjects of study from this point of view. Here Fig. 1) is a Nim tree (*Azadirachta indica*, A Juss). We find the old leaves to till occupy the crown while the rest of the tree presents its skeleton in ull view. The contrasting portions are not the base and the end of ranches as observed by Kerner, but the base and the end of the tree as a hole. The phenomenon is obviously correlated not with any question of osition, whether at base or apex, but with the question of the external actors surrounding the aerial parts of the entire plant. Insolation and umidity to which the crown is exposed are different from those to which he rest of the plant is exposed.

It may be that these persistent old leaves help the new leaves on the ower part of the plant to come out without any danger from the sun Fig. 2). When these new leaves have established themselves, the old ves disappear from the crown and are replaced by new leaves which in n are protected from scorching by increased humidity brought about by vigorous transpiration going on in the rest of the plant.

The Tamarind (*Tamarindus indica*, Linn). Supplies another interesting bject for the same study. Here the leaves that persist to the last occupy

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* Natural History of Plants by Kerner and Oliver, I, 752-3.

† Kerner and Oliver, I. 361.

the entire base, and the branches higher up which have a northern exposure Here again the question is not one of base or end of a branch, but one of exposure of the plant to its surroundings. In this case it is more difficult to offer an explanation. But the following points may have a bearing on the phenomenon. The resting and sprouting buds of Tamarind are well protected by a number of overlapping scale-leaves. The young leaves are protected by large and red coloured stipules. The cell sap of the plant is acid, and acidity* is looked upon as affording protection under xerophytic conditions by reducing transpiration. Thus it appears that new leaves do not require to be protected as they do in the tree discussed above. The retention of the leaves towards the base after those at the crown have been dropped does not appear to afford any advantage to the plant. It is probably only a question of difference in maturity brought about by differences in exposure.

Another interesting point for study in this connection is that of the season of leaf-fall. In a previous number† of this Journal I described a species of *Salix* from this point of view. With regard to such seasonal observations it has to be remembered that the seasons are not uniform by any means all over the Presidency. This causes the same species of plants to behave differently at a given time in different Districts. Thus in Kanara the appearance of new leaves may be marked a month or two ahead of the same phenomenon in northern Gujarat. The differences in the time of leaf-fall and "leaf-renewal" bring about variations in the length of period for which trees remain bare.

H. M. CHIBBER.

AGRICULTURAL COLLEGE, POONA,
June 1914.

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* Warming—*Oecology of Plants*, English Edition, 1909, p. 120.

† Vol. XXII, p. 206.

PROCEEDINGS

OF THE MEETING HELD ON 9TH JULY 1914.

An "At Home" of members and their friends of the Bombay Natural History Society took place on the 9th July 1914.

The election of the following 42 members since the last meeting was announced :—Mr. H. R. Lynch Blosse, I.C.S., Dharwar; Mr. H. M. Haslehust, Belgaum; Mr. A. C. Miller, Belgaum; Lt. G. M. Hutton, Jacobabad; Mr. G. Birch, Karachi; Mr. W. J. Curran, Maubin, Burma; Mr. L. W. H. Young, Kathiawar; Mr. C. Hurth, Bassein, Burma; Mr. G. H. Hodding, P. O. Kakina, Bengal; Mr. E. W. Carroll, I.F.S., Dehra Dun, U. P.; Mr. A. J. W. Milroy, I.F.S., Gauhati; Capt. P. J. Gout, Lashio, Burma; Capt. A. C. Norman, Silchar, Assam; Mr. S. E. Johnston, Toungoo, Burma; Lt. E. Cecil Smith, Europe; Mr. J. W. Basil Thorns-Roberts, Kindat, Burma; Dr. D. Meek, Salgunga, Cachar; Mr. C. H. Waller, Secunderabad, Deccan; Dr. H. McCormack, Nahan, Punjab; Mr. R. B. Hewson, Jalna, N. G. S. Ry.; Mr. L. N. Brown, I.C.S., Larkhana, Sind; Mr. F. W. Sprott, Bombay; Mr. R. Lecky, Vizianagram; Mr. J. N. Taylor, Mergui, Burma; Hon'ble Mr. E. V. Levinge, C.S.I., I.C.S., Government Camp, Bihar and Orissa; Lt. A. R. W. Tate, Peshawar; Mr. G. C. Cheyne, Prome, Burma; Mr. R. A. Cochrane, Mogok, Burma; Maharawal Shri Ranjitsinhji, Raja of Baria; Mr. Tribikram Pujari, B.A.; Capt. W. G. Hutchinson, I.A., Quetta; Mr. A. O. Baurle, Bombay; Mr. R. Donaldson, Sirsa, Punjab; Rev. J. E. Underwood, Mandalay, Burma; Mr. J. Elliot, Malappuram; Mr. W. S. Lamb, Rangoon; Mr. G. A. Shillidy, Larkhana, Sind; Mr. George Webb Ware, Kodaikanal; Mr. E. K. Shattock, Madras; H. H. Sir Ranbir Singh, K.C.S.I., The Maharaja of Jind State; The Principal, Trinity College, Kandy, Ceylon; and Mr. C. L. Walsh, Kalunga, B. N. Ry.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting :—

Contribution.	Locality.	Donor.
Mounted heads of 1 Gaur (*Bibos gaurus*), 2 Sambar (*Rusa unicolor*), 1 Nilgiri Thar (*Hemitragus hylocrius*), 3 Chinkara (*Gazella bennetti*).	S. India	Mr. W. C. Gaye.
Skull of Tsaine (*Bibos sondaicus*) ..	Burma	Mr. T. A. Hauxwell.
Horn of Indian Rhino (*Rhinoceros unicornis*).	Assam	Mr. F. W. Gore.
Caracal	Waziristan ..	Capt. F. L. Hughes.
Palm Covet (*Paradoxurus niger*) ..	Baroda	Mr. W. E. Jardine, C.I.E., I.C.S.
1 Ratel (*Mellivora ratel*) ..	S. W. Persia ..	Capt. A. T. Wilson.
2 Snakes		
1 Lizard		
Otter (*Lutra lutra*)	Chitral . ..	Capt. H. F. D. Stirling.
Marmot (*Marmot sp.* ?)		

Contribution.	Locality.	Donor.
1 Indian Marten (*Martes flavigula*)	Chitral	Major Banks.
1 Wild Pig Skin and 5 Skulls (*Sus cristatus*).	Saugor	Major Knowles.
South Indian Marten (*Martes gwatkinsi*).	Coorg	Mr. F. Hannyngton, I.C.S.
Muntjac (*Muntiacus vaginalis*) .	Raheng, Siam ..	Mr. H. P. Macnaghten.
Scaly Anteater (*Manis crassicaudata*).	Baluchistan ..	Mr. F. Ludlow.
Blyth's Tragapan (*Tragopan blythi*).	Tibet	Capt. A. L. Molesworth.
Snow Partridge (*Lerwa lerwa*).		
Blood Pheasant (*Ithagenes kuseri*).		
Masked Finfoot (*Heliopais personata*).	Bassein, Burma ..	Mr. C. E. Milner.
Nilgiri Wood Pigeon (*Alsocomus elphinstonii*).	Castle Rock, Kanara.	Mr. R. L. Sinclair.
40 Birds skins	Nilambur ..	Mr. A. P. Kinloch.
38 Snakes, etc.		
7 Snakes	Dhulia	Capt. Gharpurey.
3 Scorpions		
4 Snakes	....	Dr. P. V. Casling.
3 Scorpions		
A number of snails	Ceylon	Major Ward and Mr. F. M. Macwood.
14 Fish	Muskat	Commander Kitson.

Minor contributions from Messrs. Baini Parshad, Robinson, E. H. Dwane, G. A. Holding, W. J. Curran, A. E. Robinson and Major A. S. Capper.

JOURNAL

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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. Stuart Baker, F.L.S., F.Z.S., M.B.O.U.

Part XV.

With Plate XVI.

ORDER HEMIPODII.

The *Hemipodii*, or Bustard Quails, are an order of small birds which in general appearance closely resemble true Quails, but, as far as our Indian birds are concerned, can always be identified at a glance by the fact that they have but three toes, the hallux, or hind toe being absent. According to some naturalists two genera are contained in the one family, *i.e.*, *Turnicidæ*, the Three-Toed Bustard Quails of the genus *Turnix*, and the Plain Wanderers with four toes, of the genus *Pedionimus*, which are confined to Australia. Other scientists, however, put this latter genus in a separate family, but, as it is not represented in Asia, this point does not interest us.

The nearest relatives of the Bustard Quails are to be found amongst the *Gallinæ*, or Gamé Birds, the *Pterocletes* or Sand Grouse, and the two Families *Rallidæ* (Quails), and *Charadriidæ* (Plovers), of the order *Grallæ*.

The principal anatomical difference between the *Gallinæ* and the *Pterocletes* and the present order lies in the formation of the vertebræ. In the two former orders the last cervical and anterior dorsals are all anchylosed in fully adult birds, whereas in the Bustard Quail they are free; in the two former, also, the last dorsal vertebra is united with the lumbar vertibræ to form the sacrum.

In the *Gallinæ* the sternum has two notches and the same with *Pterocletes*, though in the latter the second notch may be much reduced; in the *Hemipodii* there is one deep, long notch only, on

each side of the posterior border, and the episternal process is partially perforated to receive the inner ends of the coracoids.

The palate is schizognathous, as in the *Gallinæ*, but the palatines, pterygoids and basipterygoids are more like those of the Plovers.

The nasals are schizorhinal.

The muscles of the thigh are Galline except that the accessory femoro caudal is absent; in our genus *Turnix* the deep plantar tendons unite, as in other birds with but three toes, and then the combined tendons again split up to supply the three toes.

In other respects the Bustard Quail resemble the Game Birds; the young are hatched covered wtth down, and can run and feed themselves as soon as they leave the nest.

The eggs are practically invariably four in number, and are somewhat conical, being laid in the nest in the same manner, point to point, as the Plovers lay their eggs.

Family TURNICIDÆ.

Genus *Turnix*.

Bill like that of the *Gallinæ*, but rather small and slender. The wings are pointed with the first quill longest. Legs and feet moderate, the latter in some species rather long.

Our Indian species are resident throughout their range, but move higher up the mountains in the warmer months of the year, and may also move about locally in certain parts of India under stress of climatic influences.

Ogilvie-Grant recognizes twenty-one species in the Catalogue of the British Museum, and twenty-two species in his Game Birds, where he adds the species *Turnix whiteheadi* from Luzon. To these twenty-two species Grant further adds two sub-species, and of these twenty-four species and sub-species, five species and one sub-species are, according to him, represented in India.

As regards the sub-species, they are a matter of no little difficulty, but as I shall deal with these under the various species, with which they are connected in detail, further comment is here unnecessary.

The family *Turnicidæ* is composed of birds of which the female is the larger, generally the higher coloured, and always the dominant factor in all domestic matters, for, beyond laying the eggs, she has nothing to do with the rearing of the young.

Key to the Species.

A. Breast barred right across with black and white or quite black ... ... *pugnax.*

B. Breast never barred or black in the centre.

a. Central tail feathers lengthened and pointed and edged with buff; bill dark, not yellow ... ... *dussumieri.*

b. Central tail feathers neither lengthened nor pointed and with no buff margin; bill yellow ... ... *tanki.*

The different species of the *Hemipodii* have been divided into species, sub-species, or races, by the majority of naturalists since the time of Jerdon, who himself recognized three species of the Common Bustard Quail, *viz.*, *Turnix taijoor* from the plains of India, *Turnix ocellatus* from the Hills of Northern India, and *Turnix pugnax* from Java. The latest authority, Ogilvie-Grant, divides the species *taijoor* into two, *taijoor* and *pugnax*, whilst Sharpe in the Hand-List, and Oates in his Game Birds combine them all under the one name *pugnax*.

Mr. Ogilvie-Grant has dealt very exhaustively with the genus *Turnix* in the Ibis for 1889, and he there writes:

> "I am convinced that there is only one species (*T. taijoor*) which ranges through India, Burmah, Malay, Siam and China to Formosa and the Loochoo Islands, and that the key to the constant variety in the tone of the plumage is to be found in the effect of the amount of the annual rainfall in the country which the birds inhabit. By going through the whole of our huge series, I find this theory exactly borne out; for where rain is abundant the prevailing colour of the upper parts is dark brown, where it is moderate the tone is more rufous, and where it is small the birds are very bright rufous."

With this conclusion, *i.e.*, that variation in plumage coincides with variation in rainfall, we shall all agree; the only question to be decided is whether these variations of rainfall together with other possible geographical factors cause definite local variations in plumage sufficiently constant to enable one to form sub-species. I certainly agree with Ogilvie-Grant that all the Indian Bustard Quails, together with the others he mentions, do come under one species, but it seems to me they can be divided into a certain number of sub-species, capable of differentiation by plumage as well as geographically.

It is now generally accepted that the use of the trinomial system is imperative, and that geographical races, where they can be well defined, must be described as sub-species. If we also accept this as being the proper course to follow, we find that the Bustard Quail is a species essentially divisible into certain well-marked races, the difference between which consists, principally in the amount of rufous and depth of colouring on the upper parts, and, to a rather less extent, in size.

The British Museum has a magnificent series of specimens of the species *Turnix pugnax*, and I have also had the advantage of examining those in the Calcutta Museum, in addition to a very great number which have passed through my hands from collectors

in various parts in India. A careful study of this material has led me to the conclusion that there are four well-marked sub-species of Bustard Quail of the species originally described as *pugnax* by Temminck from Java, a bird which cannot be distinguished from that found in Ceylon.

Beginning at the extreme east of the range of this species, we get a bird whose whole upper surface is very richly marked with large bold bars of black with a considerable amount of deep rufous colouration in between the bars. It must be remarked also that this rufous is not the same tint as that of the birds of Southern and Western India, but is deeper and redder, thus giving a very handsome appearance to the upper plumage.

As regards size, the bird of this form is about the same as that from Malay and Burmah, the females have a wing averaging about 3·45″ (=87·6mm.) and the males about 3·10″ (=78·6mm.). The largest female has a wing of 3·56″ (=91·2mm.) and the smallest one of 3·32″ (=84·4mm.).

This race extends from Formosa, through Southern and Western China by the Hill Ranges into the Shan States, and also into the Chin Hills further South, whence there are several typical birds of this race in the British Museum from Karen Nee.

This race should bear the name *Turnix pugnax atrogularis*, Eyton (1839).

Leaving the extreme East of the range, we find another race much the same in size, and quite as dark in general colouration; but almost entirely wanting the rich rufous on the upper parts, and also less boldly and richly marked with black.

The dimensions of this sub-species are as follows: the smallest birds being found in Southern Burmah, and the largest in Sikkim and Nepal. In the Federated Malay States a huge series of birds show an average wing measurement for females of 3·50″ (=89·7mm. and for the males of 3·13″ (=79.5mm.); from Burmah they average respectively 3·40″ (=86·4mm.) and 3·09 (=78·5mm.), and from North-East India they rise again to 3·51″ (=89·9mm.) and 3·24″ (=82·3mm.), the average of the females being reduced by two or three small immature birds.

This sub-species is found throughout the Federated Malay States and Siam, the Plains of Burmah and Northwards from Arakan, through Chittagong and the Chittagong Hill Tracts, Comilla, Assam, Cooch Behar, the Dooars of North-East Bengal and thence into Sikkim and the Hills of Nepal. Southwards it is found throughout the Surma Valley, Mymensingh, Dinajpore, Jalpaigoori, the Darjeeling District and all along the Sub-Himalayan Terai as far West as Bettiah. In the extreme West of its range in Nepal the birds have a certain amount of rufous on their upper plumage, as would be expected, from the comparatively dryness of

its habitat; in the same way birds from Pegu and certain of the drier portions of Southern Burmah also somewhat approach the South Indian form, but are still, on the whole, nearer to the typical Burmese form than to the South Indian one.

This race, or sub-species, should be known as *Turnix pugnax plumbipes* (Hodgson, 1837).

Directly we get South of the districts named as being the habitat of *Turnix p. plumbipes* we come to yet a third sub-species, a decidedly smaller and very much paler race, typically of a very bright rufous above, but running from this colour to a pale, almost isabelline grey in birds from the extreme North-East of its habitat. As a rule in this race the under parts are at least as strongly marked as in *plumbipes*, but, in addition to being paler and more rufous on the upper parts, the pale borders to the scapulars and wing coverts, generally, are far more developed, and there are also more of the longitudinal pale marks on the back.

In size this bird is at once noticeably smaller than the preceding sub-species. Calcutta females have a wing of 3·32″ (=84·3mm.) and males of 3·03″ (=77·0mm.). Those from North-West, Central and West India are practically the same, whilst those from South India have them under 3·20″(=81·3mm.) and 2·93″(=74·4mm.) respectively.

This form occurs in its Easternmost limits in and about Calcutta, and specimens obtained in the Botanical Gardens of that city are very pale, quite as pale as many Southern Indian birds, but they are of an isabelline grey rather than a rufous, though one specimen has this colour considerably developed. From Calcutta it works Westwards, South of the Indian districts mentioned above, and by the time Manbhoom is reached we have a typical Southern Indian pale rufous bird. North and West it stretches away to Oudh and the North-West Provinces into Bombay, Cutch and Rajputana and South to the extreme limits of Madras and Travancore, also crossing into the North of Ceylon.

This sub-species is that which Sykes named *taijoor* from specimens obtained by him in the Deccan, and it will therefore stand as *Turnix pugnax taijoor* (Sykes, 1832).

In Ceylon we have yet another race which is, once more, darker above, approaching very nearly in colouration to the birds found in China and the Shan States, but it is less rich in general tint, not quite so dark, and has, in most of the females, a fairly well defined rufous collar on the nape and upper shoulders. In the numerous specimens of Southern Indian birds which I have examined, I can find no trace of this collar in any well-made and complete skin, and the Ceylon form seems to be exactly the same in every detail as that which is found in Java and Sumatra, which Ogilvie-Grant has divided from *taijoor* as a sub-species, named *pugnax*.

This sub-species is a considerably bigger bird than the Southern Indian form, females from Ceylon, Java and Sumatra—all much the same in wing measurements—having a wing of 3·33″ nearly (=85·5mm.), and the male one of 3·05″ (=77·5mm.).

This form being the one first described will bear the name *Turnix pugnax pugnax* (Temm., 1815).

Of the whole number of specimens of Bustard Quails examined by me during the preparation of this paper, I find there are but three of the British Museum collection which call for special attention.

The first of these is a bird collected for the Tweeddale Collection and marked Oudh. No particular locality in that Province is given and "Oudh" is probably wrong; the hand-writing in which the locality is written is not the same as that of the other details on the ticket, and the bird is possibly one from the Nepal Terai, N. of Oudh.

There are also two birds from the Deccan collected by Sykes, one of which is his type of *taijoor*, and a third which closely approximates three from Raipur in the Hume collection. The two former are exceptionally dark birds for the Deccan, but they are specimens which had been mounted in the Museum for many years, having been collected in 1863 and 1864, so that it is extremely probable that they have got dark and dull coloured, and have lost much of their red colour. Reds and yellows are the most quickly evaporating of all colour pigments in birds, and remembering this, there do not seem to be sufficient grounds to reconsider the sub-specific value of the colouration of the upper parts. Typical birds from the Deccan and Raipur are more than usually pale and red-coloured, and the most that could be said of these three birds is that they show a connecting link between *taijoor* and *plumbipes*, and on the whole they are nearer typical *taijoor* than typical *plumbipes*.

Of course, all four sub-species vary *inter se* to a considerable extent. Thus we find birds in certain areas in Burmah, such as Pegu, which are paler, more rufous, and also below the average in size when compared with typical dark Burmese specimens. At the same time, when series from various parts of the empire are collected and mixed together, there is seldom any difficulty in sorting them out without reference to their tickets. Southern Indian birds are very remarkably constant in their colouration, and there is no such thing as a skin from South of Madras being similar to one from N.-E. Bengal or Assam. As one works North and East, however, the colour of the upper plumage deepens somewhat, and the birds grow a little larger, so that at the extreme limit of range of each sub-species, specimens may naturally be obtained which are difficult to define.

KEY TO SUBSPECIES OF *pugnax*.

A—Upper plumage very dark and boldly marked with black.

a. A rufous nuchal collar on female.

a^2 Wing about 3·05″ ... *pugnax*. ♂

b^2 Wing about 3·30″ ... *pugnax*. ♀

b. No rufous collar.

a^1 Upper plumage marked with rich rufous red.

c^2 Wing about 3·10″ ... *atrogularis*. ♂

d^2 Wing about 3·45″ ... *atrogularis*. ♀

b^1 Upper plumage equally dark but duller and with a paler rufous, less in extent.

e^2 Wing about 3·20″ ... *plumbipes*. ♂

f^2 Wing about 3·50″ ... *plumbipes*. ♀

B.—Upper plumage pale, a pale bright rufous red or isabelline predominating over the black.

g^2 Wing about 3·0″ ... *taijoor*. ♂

h^2 Wing about 3·25″ ... *taijoor*. ♀

The above key is admittedly a weak one, but this must always be the case when dealing with sub-species, the differences between which consist almost entirely in depth and intensity of colouring. Extreme types when placed close together bear but little resemblance to one another, but all sub-species intergrade on the confines of their habitat, and it is then extremely difficult to say to which sub-species they belong.

TURNIX PUGNAX PUGNAX (Temm.).

The Ceylon Bustard Quail.

Hemipodius pugnax.—Temm., Pig. et Gall. iii, p. 612, 754, (1815) (Java).

Turnix taijoor.—Jerdon, B. of I., iii, p. 595 (part); Hume and Marsh., Game B., ii, p. 169 (part); Legge, B. of Cey., iii, p. 361; Oates in Hume's Nests and Eggs, 2nd ed., iii, p. 367 (part); Ogilvie-Grant, Cat., B. M. xxii, p. 530 (part); A. L. Butler, J. B. N. H. S., x, p. 313.

Turnix pugnax.—Sharpe, Hand-List i, p. 48 (part); Oates, Cat. Eggs, B. M., i, p. 69 (part); Ogilvie-Grant, Game B., i, p. 265; Blanford, Avifauna, B. I., iv, p. 150 (part).

Vernacular names.—Kadai (*Ceylonese Tamils*) Waltuwa, Pundura-Waltuwa, Bola-Waltuwa (Cinghalese).

Description, adult female.—Upper plumage dull, rufous-red to dark, rather brownish grey, the head is usually a trifle darker than the other parts, whilst the rump and tail coverts may be slightly paler; feathers of the crown in the centre tipped white, often

forming a definite coronal streak, the rufous on either side more or less barred and spotted with black; lores, supercilia and sides of the head white with narrow margins or small spots of black; nape, shoulders and upper back finally barred with black, these parts, specially the nape, being often much spotted with white; a broad, well-marked nuchal collar of rufous, sometimes quite unmarked with other colours, rarely slightly spotted with black and white, on the lower neck and upper back; lower back, rump and upper tail coverts much more boldly barred with black and white marks, either lines or large spots on the outer webs of the lower back and rump feathers and the tips of the upper tail coverts; scapulars like the back, but often a little paler, still more boldly marked with black and white, the latter predominating. Wing coverts like the back, but rather paler, the greater and median boldly spotted with buff and black, the amount varying in individuals, and the buff on the outer webs often forming a fairly distinct broad bar across the closed wing: lesser coverts and shoulder of wing less conspicuously barred. Quills brown, not very dark, and bordered on the outer webs of the primaries with pale buff; primary coverts the same, but often much freckled or barred with buff; the innermost secondaries are like their greater coverts, and those nearest them are tipped pale and barred to a slight extent on the outer webs at their ends. Below chin, throat and centre of neck and breast, deep, velvety black; sides of lower neck and breast buffish white to buff, broadly barred with black, and a few bars extending across the breast below the black and the barring sometimes continued well down the flanks; remainder of lower parts rufescent buff to deep rusty buff, usually darkest on the vent and under tail coverts.

Under aspect of the wing and axillaries dark silver grey.

Colour of soft parts.—Legs and feet slate or leaden grey; bill dark bluish slate or plumbeous grey, the culmen slightly darker, especially at the base where it is quite a dark brown; irides white, occasionally yellowish.

> "Irides white; bill light leaden, dusky brown on culmen; legs and feet pale bluish or fleshy grey, with the joints and tarsus washed with bluish" (Legge).

Measurements.—Total length about 5·3″ (=134·6mm); wing 3·33″ (=85·5mm); tarsus about 1·0″ (=25·4mm); bill from gape about ·65″ (=16·5mm), and from front about ·50″ (=12·9mm), tail about 1″ (=25·4mm). Legge gives the total length as about 6·3″ to 6·5″, and the wing as 3·4″ to 3·55″, but none of the specimens in the British Museum have a wing as large as this latter. Legge however includes Indian birds in his measurements, and those from upper India run very large.

Description, adult male.—Like the female, but has the chin white instead of black, the breast and foreneck banded black and buff

like the sides, instead of pure black. As a rule, the markings are somewhat less bold in character, and the general appearance is duller.

Colours of the soft part.—As in the female, but iris, more often straw yellow.

Dimensions.—Wing 3·05″ (=77·5mm), and other measurements proportionately smaller than in the female.

"Length 5·8″ to 6·0″; wing 3·0″ to 3·1″; tail ·8″ to 1·0″; "middle toe and claw 0·80″; bill to gape ·67″." (Legge).

Young females only differ from the adult in having chin, throat and upper breast like these parts in the male.

Quite young birds of both sexes have the plumage similar to that of the adult male, but the black on the upper parts is more plentiful, though duller; the secondaries are more marked and freckled with buff or rufous, and the primaries are, perhaps, also rather more widely margined with the same. The breast is spotted with large drops of black which, sometimes, are rather arrow head in appearance, or sometimes become broadened into broken bars, but never form complete bars as in the adult. The variations in tail follows the same range as that of the old birds.

The nestling when hatched is covered with pale whitish buff on the lower parts, and dark chestnut buff above. There is a broad white line from the lores, through the eye to the nape, a dark coronal streak, almost black, and there are pale buff and black crescentic marks on the back; the wings have a dark and a pale bar, and the inside of the thighs are chestnut.

Certain naturalists have claimed that the black throat of the female is merely a seasonal change, and is lost after the breeding season. When a bird has as variable a breeding season as the Bustard Quail has, it is very difficult to assert that such is, or is not, the case; but the probabilities are all against it. The hen assumes this black during the process of a moult, and possibly takes two years before she fully acquires it, but birds may be found in *every* month of the year with this black fully developed. Hume obtained black-throated females in every month but September and January, and I have seen such specimens of this or the other sub-species in these months also.

Distribution.—Ceylon, Java, Sumatra and Billiton.

Legge thus records its habitat within the Island of Ceylon:—

"This Bustard Quail is scattered over most of the open country in Ceylon, being more numerous in some localities than in others. In the maritime districts of the Western Province, including the seaboard from Manaar southwards to Chilaw, and in suitable localities round the South-West coast, it is perhaps more common than elsewhere. Again, in portions of the Eastern Province where the ground is sandy and covered with low bushes, it is numerous, as in the

> Yala district, where Mr. Bligh writes me it was abundant; and in the Northern parts of the low country it is found in old clearings overgrown with grass and shrubs, and also on open bushy lands on the borders of tanks. It is common in the Cinnamon Gardens, Negombo, Colombo, and Morotuwa, and breeds even in public resorts, such as the Circular, etc., where there are bushes to afford it the necessary cover."

Legge did not find it at any great elevations, but I have received it from nearly 4,000 feet, and doubtless it will be found even higher than this, provided there is suitable open country.

Nidification.—The nidification of this Bustard Quail is similar to that of the other sub-species, that of *plumbipes* being described at length hereafter.

Legge says that in Ceylon it lays "from February till May, and most likely has another brood later in the year." As with all these birds, it is the male which incubates the eggs, and Legge and Captain Butler both found the cock bird sitting on eggs. Apparently in Ceylon two eggs only are sometimes laid, a number which is very exceptional elsewhere. The eggs themselves cannot be distinguished in any way from those of *atrogularis* and *plumbipes* though they average a trifle smaller. Those which I have been able to personally measure averaged ·93″ × ·75″ (=2·37 × 1·90mm), and Legge records their length as varying from ·90″ to ·98″, and the breadth from ·69″ to ·75″.

Habits.—Writing of the Ceylon Bustard Quail, the author above quoted, writes that it is—

> "an inhabitant of open scrub, long grass dotted with bushes, the outskirts of low jungle, cinnamon plantations, and such-like situations where cover is combined with grass and rank vegetation. It is rarely found in damp spots and in fact is especially partial to sandy soil, which is the driest soil to be had anywhere in the maritime regions of Ceylon. It is only when accompanied by their young brood that these birds are found in coveys; they are generally met with singly, or two at some little distance from each other; they lie close, and when they rise, either fly back straight over your shoulder, or dart like an arrow round the nearest bush, suddenly alighting when out of reach of danger."

Legge also refers to their polyandrous habits, which they share with others of the genus, and describes the way the hens fight for the possession of the cock. He writes, "they fight like the common hen, stretching up their heads and trying to circumvent each other, pecking out vigorously all the while," and elsewhere he records that so intent do they become on their fights that he has driven up to and stopped his carriage within a few yards of a pair fighting by the roadside, without their taking any notice of him.

The voice of the hen is similar to that of other members of the family, and their food is also the same, *i.e.*, half vegetable and half insectivorous.

Turnix pugnax plumbipes.

The Burmese Bustard Quail.

Hemipodius plumbipes.—Hodg., Icon.,ined. in Brit. Mus., Nos. 126, 127, *id*, Bengal Sporting Mag., 1837, p. 346.

Turnix ocellatus.—Blyth, Cat. B. Mus., As. Soc., 1849, p. 29; Swinhoe, Ibis, 1863, p. 398 (Formosa); Godwin-Aus., J. A. S. B., xliii., pt. ii., p. 174; Jerdon, B. of I., iii., p. 597.

Turnix taijoor.—Oates, in Hume's Nest and Eggs, 2nd ed., iii. p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii. p. 530 (part); *id.*, Game B., i., p., 265 (part).

Turnix pugnax.—Gray, Hand-List B., ii., p. 271; Stoliczka, J. A. S. B., xxxix, pt. ii, p. 333 (part); Hume and Oates, Str. Feath, iii., p. 178 (Pegu); *id.*, Nest and Eggs, iii., p. 553 (part); Hume and Inglis, Str. Feath., v., p. 45 (Cachar); Ogilvie-Grant, Cat. B. M., xxii., p. 534; Sharpe, Hand-List i, p. 48 (part); Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna, B. I., iv., p. 150 (part); Stuart Baker, J. B. N. H. S., xii., p. 492; Inglis, *ibid.* p. 677; Mears, *ibid*, xviii, p. 89; Harington, *ibid*, xix., p. 365; *id*, *ibid*, xx., p. 377; *id.*, *ibid.*, xx., p. 1011; Venning, *ibid*, xxi., p. 632; Hopwood, *ibid*, p. 1215.

Turnix plumbipes.—Blyth and Wald., Cat. Mam. and B. of Burmah, p. 152 (1875); Oates, Str. Feath., v., p. 164; Hume and Davis., *ibid*, vi., pp. 450, 521; Hume, *ibid*, viii., p. 69; Scully, *ibid*, p. 350; Hume and Marsh., Game B., ii., p. 177; Gammie, Str. Feath., viii., p. 453; Hume, Cat. No. 833; Oates, B. of Burmah, ii., p. 337; *id.*, Str. Feath., x., p. 236; Hume, *ibid*, xi., p. 310.

Vernacular names.—Timokpho (Leptcha); Tinisk (Bhutia); Ngôn (Burmese); Sunsorai (Assamese); Daoduma (Cachari); Inruibuma (Kacha Naga); Vohbubum (Kuki); Purjoh Peyoo-Kabun (Malay); Guske-coone, Vock-coone (Siamese).

Description, adult female.—Similar to the Ceylon Bustard Quail, but wanting the rufous nuchal collar. It is also a rather darker bird with more rufous on the upper parts, and the black not quite so rich or velvety. The under parts are usually paler.

Adult male differs from the female as does the male of *pugnax*.

Colours of soft parts.—Same as *pugnax*.

Measurements.—The wing varies in length on an average between 3·40″ (=86·4mm.) for Burmese birds and 3·51″ (=89·9mm.) for North-East Indian female birds, and from 3·09″ to 3·24″ respectively for the males. Hume gives the measurements as follows:—

"Females—length, 5·44″ to 6·37″; expanse, 11·0″ to 12·5″; wing, 3·0″ to 3·45″; tail from vent, 0·9″ to 1·38″; tarsus,

0·9″ to 1·02″; bill from gape 0·68″ to 0·78″; weight 1·7 to 2·25 oz."

"Males—length, 5·6″ to 6·25″; expanse, 10·9″ to 12·3″; wing, 3·12″ to 3·5″; tail from vent, 1·0″ to 1·4″; tarsus 0·95″ to 1·12″; bill from gape, 0·7″ to 0·81″; weight 1·5 to 2·65 oz."

I give Hume's measurements and weights in full, but cannot understand them, as they are almost exactly contrary to my own measurements, which, in agreement with other observers and naturalists, shew the female to be a decidedly bigger bird than the male. Jerdon gives the wing measurement of this form as 3·6″, and says that the male is smaller.

Distribution.—Federated Malay States and West Siam, the Plains of Burmah and the whole of the Western and Southern Burmese Yomas, or Hill tracts; the North and North-West Chin Hills, Chittagong and its Hill tracts, the whole range of country, plains and hills, extending West as far as Sikkim throughout Assam and the Bengal Dooars and Nepal, together with the wetter, better forested districts at their base, from Mymensingh to Bettiah in Behar where however it meets the Southern form *taijoor* and intergrades with it.

Nidification.—They breed practically all the year round, principally between April and September, and one hen will apparently go on laying eggs as long as she can find a supply of husbands to hatch the eggs she lays and to look after her innumerable progeny when hatched.

Dr. H. E. Butler, quoting from the German of Huth, tells us that in 1890, a female *Turnix nigricollis* laid no less than 8 clutches of eggs, and from 3 of these young were hatched. It must, however, be noted that Huth speaks of the female of this species as being "a pattern of love, attention and solicitude towards the little chick."

I have had *plumbipes*, *tanki* and *dussumieri* in captivity, but I found that though I could keep any numbers of the males together, I could not keep two females, as they always fought until one was disabled. Unfortunately I never managed to induce them to breed, though the hens would drop casual eggs here and there, of which they took no notice.

It is the cock bird that has to do all the hatching and looking after the young, and the hen, as soon as she has laid her first set of eggs, goes off to hunt up another male to look after her second, and so on, until matrimony palls for the season, and she either indulges in lonely blessedness or joins one or two other ladies who are also grass widows for the time being.

The male, having hatched the eggs a process which takes about twelve days, then looks after the young and brings them up, performing his duties in the most admirable manner, feeding, tending them with the greatest solicitude, brooding them at night and

fighting for them against all possible enemies, sometimes, including their mother, with the greatest bravery.

Whether, when in a state of freedom, having brought up one family, he thereupon undertakes the duties of a second it is impossible to say; but in captivity, when he is the only gentleman available, the lady generally enforces these duties upon him, at least twice, if not more often.

As regards the nest, Hume says:

> "Sometimes this species makes no nest at all, and merely scratches a hollow at the base of, or in the midst of, some tuft of Sirpatta grass, or occasionally some little dense bush adjoining or surrounded by long grass. Sometimes it makes a little pad of rather soft, dry grass, three, or at most, four inches in diameter, and half an inch in thickness, which it places as a lining to the hollow."
>
> "Generally it does scratch a hollow for itself, but at times natural hollows or the hoof prints of cattle are accepted and used, with or without a lining, without so much as a trace of the lazy little bird's feet being visible."

Hume adds an amusing account of how the male is forced, according to native ideas, by the female to sit on the eggs, and

> "thereafter gives him a tremendous thrashing if ever she catches him away from these . . . an old Moghul Shikari . . . used to aver that he had often watched the males feeding near the nest, rush on to the eggs at the sound of the female's call, and sit there looking as if they had not left the nest for at least a week, until the female appeared, walked once or twice round the nest, and strutted off again, calling vociferously, as much as to say, 'Lucky for you it's all right, my little friend'".

Hume in writing this includes all the different forms, and it is quite possible that his description is quite accurate in so far as it refers to the Common Bustard Quail of the Plains.

Personally, though I have seen many hundreds of nests of *plumbipes*, I have never seen the eggs laid on the bare ground. As a rule the nest is placed just inside scrub, grass, or bamboo jungle alongside some open piece of ground, and a very favourite place for the nest is at the edges of the paths used by the hill villagers. These paths are cleared every year for a width of some 6 to 10 feet, but each rainy season the grass springs up and covers, more or less thickly, all but the centre, which is trodden hard by the constant traffic. Time after time when walking or riding along these primitive tracks, I have put up the bird from my feet, and looking down have seen the eggs snugly tucked away at the roots of a thick tuft of grass.

In nineteen cases out of twenty, or perhaps even more, the nest consists of a thick pad of fine grass from $3\frac{1}{2}$ to $4\frac{1}{2}$ inches in dia-

meter, fitting into some natural hollow, deepened, cleared, and made circular by the birds themselves. In the centre the pad is from ½ to 1½ inches deep, and the sides curl up a little with the sides of the hollow. Often the nest is wedged in amongst the actual roots of a tuft of grass, the central blades being beaten down or forced aside to form the requisite space, and the softer parts of the broken grass helping to form the pad itself. As a rule the midribs of the coarser grasses are discarded, and only shreds from the sides of the blades used, but now and then one may find a few roots, tendrils, fern fronds, or other similar materials made use of in the construction of the pad. When made in comparatively thick grass, more especially where this is sundried or withered, the Bustard Quail sometimes makes a regular domed nest, though I have never seen one made as elaborately as that described by Dr. Seth Smith as being built by *Turnix tanki*. I think, as a rule, the dome is as much accidentally as purposely made; the birds get into a tangle of grass, more or less withered and broken down, and in making the foundations for the nest pad, they force themselves this way and that, push pieces of grass to one side or upwards, and thus make a hollow which they line and over which the twisted grasses are made into a dome.

The number of eggs laid is normally four, and this number is very rarely exceeded, and three eggs, hard set, are just as rarely found in a clutch.

Jerdon talks of as many as eight eggs being laid in the same clutch, and Hume says that in thirty nests taken by himself he has seen two clutches of five and one of six. I am afraid to say how many nests I have seen of this bird, but it must be nearer a thousand than five hundred, yet amongst all these I have known but one clutch of six eggs—that was brought to me—and perhaps four of five eggs.

In North Cachar I have seen—not necessarily taken—as many as a dozen nests in a day, and I worked this district for fifteen years; after this I was in Dibrugarh five years and in the Khasia Hills yet another five, and in both places *Turnix pugnax plumbipes* was most plentiful; certainly no year has passed without my seeing twenty clutches of its eggs.

After this experience it may be safely asserted that clutches of anything but four eggs are abnormal.

In shape the eggs are generally broad ovals with the small end pointed rather sharply, and they vary from broad obtuse ovals to typical, if squat, peg top shaped eggs. The normal egg has a greyish white ground colour, sometimes tinged with a suspicion of yellow or red, and they are covered all over with innumerable dots and specks of dull yellowish and reddish brown with other spots and blotches, some so dark as to appear dull vandyke brown or black.

The secondary markings are of pale purple or lavender grey, but are in most cases almost obliterated by the superior markings.

In some eggs the markings are all reduced to the very finest dots, in others they are all rather bolder, and in others again the two are intermixed. In a few the big dark blotches outnumber the smaller marks and give a more handsome appearance to the egg. As a rule the spots, etc., of whatever nature they may be are distributed thickly all over the egg, but even more so towards the larger end where they sometimes form a well defined ring or cap, the markings in which are bolder and darker than elsewhere.

In a few eggs in my collection the ground colour is decidedly reddish, and the markings, which consist of reddish and deep brown, are very large and handsome, giving the whole egg quite a bright red tint. Fewer still than these, but yet now and then met with, are eggs in which yellow predominates rather than red.

The surface is fine and close, and often has a considerable gloss, and the shell is very stout for so small an egg. The internal skin is pure white.

The average size of the eggs of *Turnix pugnax plumbipes* is exactly 1·0″ × ·82″ (=2·54 × 2·08 mm.) and they range in length from ·89″ to 1·16″ (=2·25 to 2·94mm.), and in breadth from ·76″ to ·89″ (=1·93 to 2·25mm.); the average given is that of 526 eggs.

Habits.—This Bustard Quail is found at all heights up to 8,000 feet, and again well out into the plains, but though it is a bird of more or less open patches of country, it is also essential that such open country should be interspersed with forest and jungle, and well watered.

Hume seems to have thought that to a certain extent Bustard Quails are migratory, moving about according to the season in the plains and higher or lower in the Hills in the hot and cold months. In the drier portions of their habitat in the plains, it is probable they are only to be found after the rains commence, leaving them again as soon as the winter drought begins to take effect, but as regards elevation, heat and cold seems to have no effect, and they may be found at Darjiling at 8,000 feet elevation all the year round. So also in the North Cachar, Khasia and Naga Hills they may be found equally numerous all the year, either in the plains at their foot, or in the higher hills. In North Cachar I found it quite common at 6,000 feet in December and January.

It may be found in almost any kind of country other than dense forest without openings, or, the opposite extreme, sandy open grass land without any forest near it. Perhaps it prefers, above all other kinds of ground, thin grass or scrub jungle, more or less broken up with bare patches or with cultivation. At the same time, it may be

found almost equally often in bamboo jungle or in thin tree forests which have lots of low grass or other light undergrowth.

In North Cachar it was extraordinarily numerous, and one could not go along the narrow village paths for an hour's walk or round any field of Hill-rice without putting up several. In the plains I have nowhere seen them so common as this, and Hume, writing of the Burmese form, *plumbipes* in comparison with the Indian form, *taijoor*, says:

> "They seem to me to be more sparsely distributed than is the Indian bird. Of the latter you might in many places, with good dogs and small charges, bag by hard work at least a dozen, and possibly twenty couple in a day, whereas, from what I know myself, and from what I hear from others, I doubt if you could anywhere shoot even half the number of *plumbipes*, fag as you might."

I think, however, there are some places in North Cachar where one could get as many as twenty couple in a day *if* any one ever desired to get them, but, of course, it would be necessary to cover a lot of country, have some useful dogs to help, and also hold straight.

They are not really as easy birds to kill as one would imagine, until their ways are learned. They generally get up very close to the shooter, often at one's very feet, and they then buzz straight off for some twenty yards or so, and tumble headlong into the grass again. They fly at quite a good pace, though perfectly straight, in fact, very much as a common Quail does; but they are so tiny that if fired at close, and hit, there is nothing left to pick up, and if time is allowed for them to get a fair distance, they take advantage of it to make one of their disconcerting dives into the grass. Many men will not agree with the dictum that there is no sport in shooting them, as one has to be very quick to kill these little birds with any certainty, and, once missed, there is little chance of ever seeing them flushed again. Where the grass and bushes are extensive, even good dogs find it a hard job to flush a bird twice; but I think they generally rise fairly well the first time, though even then not until they are almost trodden underfoot by the gunner or caught by his dog.

It is a wonderful little runner, and seems to be able to keep ahead of the fastest dog in grass or bush if the latter tries to follow it up by scent, and if the dog tries to rush it, it just slips to one side, and allows the animal to shoot past it. I had a very good example of this once when shooting some of these Bustard Quail for specimens in a patch of grass half eaten down by village buffaloes, and intersected in all directions by small paths and buffalo tracks. I had two Bhutia dogs with me, both keen sportsmen, with excellent noses but impetuous temperaments, and the dogs and I had all seen three or four of these Bustard Quail driven into this patch from others a few yards away. The patch was not 10 yards wide by 50

long, yet in half an hour's bustling we got but one bird, and that I shot as he raced across a strip of open to another patch. Three or four times a bird would come out a foot or two into the open and then double back as one of the dogs came rushing past it.

Although such a little skulker, the Bustard Quail by no means shuns humanity or human habitation, and is often found in gardens of bungalows, scraps or bush and grass round about, and even in the middle of villages. They are common in tea gardens, and feed continually within very short distances of women plucking tea, or men hoeing the ground between the bushes. In many parts of India they seem to be peculiarly partial to the borders of rough grass growing at the edges of tanks, and to the softer grass in Mango topes or orchards. In Sylhet and Cachar I also often found them in small strips of dry grass land surrounded on all sides by water and swamp, and we often added one or two to our bag when out snipe shooting by making a man beat the small pieces of high grass land dotted about here and there in amongst the rice fields.

It is an excellent article of diet, and Bustard Quail on toast, though a much smaller, is quite as excellent a morsel as any real Quail.

In this species, as in all others of the genus, the female bird is the one which "wears the breeks" in their family arrangements, and it is she who fights for the male whom, when fought for and won, she completely dominates and henpecks. In a wild state, the hen bird attracts the male to her with a loud booming call, generally described as a purr or as a cross between a purr and a coo. Dr. Seth Smith writes of their call:

> "The call note uttered by the Hemipodes seems to be much the same with all,—a soft booming, which is more or less ventriloquial. The female utters the note far more frequently than the male, and I am not sure that he calls at all, but I believe he does occasionally. This note may be almost called a 'Coo'; I have frequently mistaken it for the coo of the Bronze-winged Pigeon in the distance. Some writers have likened it to the distant bellowing of a bull, and the Mediterranean form, *T. sylvatica*, is known as 'Torilla' or 'little bull'."

The sound is also not unlike the deep guttural purr, or grunt of a tiger, and sometimes, when hurrying along a lonely jungle path as evening was coming on, it would give one quite a start to hear the call come soft and deep from just behind. On moonlight nights the female birds call incessantly during the breeding season, and in the stillness and darkness their voices sound extraordinarily loud. I think the bird often mounts on any convenient hillock to "boom", but she never gets on to a stump or branch. Her attitude when calling is crouched rather low on the ground with her wings outspread on either side and gently quivering.

The females are very pugnacious at all times, though more especially so when breeding, and their pugnacity is taken advantage of by natives of many parts of the country to entrap them. Jerdon thus describes how the first cousin of this bird, *taijoor*, is caught in the South of India:

> "For the purpose a small cage with a decoy bird is used, having a concealed spring compartment, made to fall by the snapping of a thread placed between the bars of the cage; it is set on the ground in some thick cover, carefully protected. The decoy bird begins her loud purring call, which can be heard a long way off, and any females within earshot run rapidly to the spot and commence fighting with the caged bird, striking at the bars. This soon breaks the thread, the spring cover falls, ringing a small bell at the same time, by which the owner, who remains concealed near at hand, is warned of a capture, and he runs up and secures his prey and sets the cage in another locality. In this way I have known 12 to 20 birds occasionally captured in one day, in a patch of thick, bushy jungle in the Carnatic, where alone I have known this practice carried on. The birds that are caught in this way are all females, and in most cases are birds laying eggs at the same time, for I have frequently known instances of some eight or ten of these captures, so far advanced in the process as to lay eggs in the bag in which they were carried, before the bird catcher had reached his house."

In North Cachar the Nagas had a somewhat similar way of catching them. A hen bird was pegged down by one leg to the ground by a piece of string about a couple of feet long, and all round her, at a distance of five feet or so, where the ground had been partially cleared, were placed innumerable nooses of goat's, or mithun hair tied to inconspicuous creepers.

As soon as the decoy bird settled down, the Naga would get behind a bush, whilst I, when I looked on, would select a tree where from a few feet above the ground one could see all that took place. After being left alone for a few minutes, the hen would preen and clean herself, and presently start booming, at first sitting up in a semi-erect position, but gradually lowering her breast to the ground, with out-stretched wings, and blowing herself out with each boom until she looked like a little feather balloon. As a rule we had not long to wait before there was an answering boom, and almost immediately a Bustard Quail would slink up and, if not caught in one of the outer nooses, would also squat a second or two and then boom back at her opponent once or twice, after which she would rush headlong to the fight. As a rule she was caught at once in the nooses, but sometimes she would escape these and, seizing on the tethered female, engage in a mortal combat. In such cases the

two birds always seemed so keen on the fight that it was easy to throw a cloth over them and secure the wild with the tame.

That the boom is a call to the male as well as a challenge to the female was shown by the fact that cock birds as well as hens were sometimes caught. I once saw a male snared, and his attitudes and modest demeanour as he approached his lady love were most amusing. There was no cooing or purring on his part, but he slunk up close to where she was and then squatted in the grass, back to her, and some six feet away. Here he lay quite still while she boomed away, bowed, danced, and scraped to him in a perfect ecstacy, yet prevented from approaching any nearer to him by her tether. At last, seeing that she would not go to him, the male commenced sidling up to her, only a few inches at a time, until he stepped into a noose, and was trapped.

So pugnacious are these birds that they will often continue to fight in their small cages almost immediately after they are trapped, and it would be impossible to keep breeding hens together with any safety.

Turnix pugnax taijoor (Sykes).

The Common Bustard Quail.

Hemipodius taijoor.—Sykes, P. Z. S., 1832, p. 155 (Deccan) Bengal Sporting Mag., 1836, p. 171.

Turnix taijoor.—Jerdon, B. of I., iii, p. 595 (part); Ball, Str. Feath., ii, p. 428; Stoliczka, J. A. S. B., xlii., pt. ii., p. 250; Butler, Str. Feath., iv., p. 7 (N. Guzerat); David. and Wen., *ibid*, vii, p. 87 (Deccan); Ball, *ibid*, vii, p. 226 (Ganges to Godaveri); Hume and Marsh., Game B. ii. p. 169 (part); Vidal, Str. Feath., ix., p. 77 (S. Konkan); Butler, Cat. B. of S., Bombay, p. 70; Hume, Cat. No. 832; Ball, Str. Feath., ix., p. 424; David., *ibid*, x., p. 317 (Khandesh); Davison, *ibid*, p. 412 (Mysore); Macgregor, *ibid*, p. 441 (Deccan); Taylor, *ibid*, p. 465 (Mysore); Macphersow, Str. Feath., *ibid*, p. 119; Barnes, B. of Bombay, p. 317; Butler, B. of Sind, p. 55; Oates, Hume's Nests and Eggs, 2nd ed., iii., p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii., p. 530 (part); *id.*, Game B., i., p. 265 (part); Barnes, J. B. N. H. S., vi., p. 9.

Turnix pugnax.—Butler, Str. Feath., v., p. 222 (Deesa); Fairbank, *ibid*, p. 409 (Palni Hills); Sharpe, Hand-List, i., p. 48 (part); Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna B. I., iv., p. 150 (part); Moss King, J. B. N. H. S., xxi., p. 101; Whitehead, *ibid*, p. 168.

Vernacular names.—Gulu, Gundlu, Gundra, Saiui-gandra (*Hind*), Pured, female, Kalada, male, (*Telegu*), Kurung-kadik, female, Ankadik, male, (Tamil); Durwa, (*Ratnagiri*), Karechaki, (Canarese).

Description, adult female.—Differs from *pugnax* in being much paler and much more rufous, many birds appearing, as a whole, to

be a bright, but rather pale rufescent red. The pale fulvous edges to the feathers of the back, scapulars, etc., are larger and paler, increasing the pale effect of the plumage, and the under parts are generally very much paler. The black spots on the wing coverts, though smaller, are more in the nature of bars than they are in either of the other three sub-species.

In birds from the neighbourhood of Calcutta, the rufous tint is replaced by a beautiful pale isabelline, the general tone being even paler still; the birds from Western Bengal are intermediate between the two.

Colours of the soft parts.—As in *pugnax*.

Measurements.—The Common Bustard Quail follows the general avian rule in being smaller than its more Northern and Eastern representatives.

The British Museum series—a large one—give an average wing measurement for females of just 3·25″ (= 82·5 mm.), but the average is raised by the comparatively large size of some of the Calcutta birds, which average 3·32″ (=84·3 mm.).

Adult male.—Differs from the female much in the same way and degree as does that of the other sub-species.

Measurements.—The male, as usual, is decidedly smaller than the female, the Calcutta males average for the wing 3·03″ (= 77 mm.), and the others from the Peninsular of India 2·93″ (= 74·4 mm.). Hume's measurements for this form agree with mine in so far as they make the male out to be smaller than the female, but his wing dimensions greatly exceed mine.

> "Females—Length, 6·12″ to 6·7″; expanse, 11·75″ to 12·75″; wing, 3·4″ to 3·7″; tail from vent, 1·0″ to 1·4″; tarsus, 0·95″ to 1·12″; bill from gape, 0·7″ to 0·81″; weight, 1·5 to 2·56 oz."
>
> "Males—Length, 5·6″ to 6·25″; expanse, 10·75″ to 11·7″; wing, 2·85″ to 3·1″; tail from vent, 0·9″ to 1·2″; bill from gape, 0·6″ to 0·72″; weight, 1·5 to 1·9 oz."

From the above it will be seen that Hume makes out *taijoor* to be as big a bird as *pugnax*, but it is rather difficult to say what Hume exactly included in the two sub-species so that for matters of comparison his figures are not of much value, though they are, otherwise, of the greatest interest.

It will be seen from what I have written above that birds from South-Eastern Bengal are larger than elsewhere, and are also distinguished by the curious isabelline tint of their plumage. There is not at present much material from this part of India to work on, but if further material, when obtained, corroborates what is now known, the bird will require to be separated subspecifically and given a new name, as there does not seem to be one at present applicable to it.

Distribution.—The whole of India South of the habitat of *plumbipes* down to Cape Cormorin. It is said also to enter Ceylon, but I have seen no skins which are not referable rather to the true *pugnax* than to *taijoor*. It has not yet been recorded from Sind, but I have recently had it sent to me from the Punjab, where it would appear to be only a rare straggler.

Nidification.—Not to be distinguished in any way from that of *plumbipes*, though, if Hume is correct, this continental form would appear very often to be contented with laying its eggs in some hollow without making a true nest. Even in such cases, however, a rough collection of scraps of grass, etc., are always placed in the hollow before the eggs are laid.

The season for laying may vary somewhat in different places, but it may really be said to last more or less all the year round. Scarcity of food naturally checks breeding so that in the driest portions of its habitat the driest months of the year will form a gap in breeding operations, and on the contrary when the rainfall is heaviest, the birds will cease breeding during the height of the rains.

The eggs are exactly like those of *plumbipes* and vary to the same extent, but average a trifle smaller, about ·92″ (=2·34 mm.) × ·76″ (= 1·93 mm.).

In Hume's "Nests and Eggs" Oates gives the average of 30 eggs, practically all from Southern India, as ·94″ × 0·78″ (=2·37 × 1·98 mm.); and in the Catalogue of Eggs in the British Museum he again gives the extremes of measurement, for the same series, *i. e.*, between ·8″ × 1·04″ (= 20·3 × 26·4 mm.); in length ·71″ to ·85″ (= 18 × 21·6 mm.) in breadth, but these measurements include the Eastern and Formosan eggs.

Turnix pugnax atrogularis (Eyton).

The Chinese Bustard Quail.

Hemipodius atrogularis.—Eyton, P. Z. S., 1839, p. 107.

Turnix taijoor.—Oates, in Hume's Nests and Eggs, 2nd ed., iii., p. 367 (part); Ogilvie-Grant, Cat. B. M., xxii., p. 530 (part); *id.*, Game B., i. p. 265 (part).

Turnix pugnax.—Sharpe, Hand-List, i., p. 48; Oates, Cat. Eggs, B. M., i., p. 69 (part); Blanford, Avifauna B. I., iv., p. 150 (part).

Vernacular names.—Guske-coone, Nock-coone (Siamese); Ngôn, (Burmese).

Description, adult female.—This is the most richly coloured of all the forms of the Bustard Quails, the upper parts being very boldly marked with black and deep rufous, the latter of a darker, redder tint than is found in any of the other sub-species.

The colours of the soft parts are the same as in *pugnax*.

Measurements.—Females—Wing varying between 3·32″ (=84·4 mm.) and 3·56″ (=91·2 mm.), and averaging 3·45″ (=87·6 mm.).

The males as usual are decidedly smaller with a wing of only 3·10 (=78·6 mm.).

Distribution.—Formosa and thence through South and Western China through the hill ranges and thence into the South-Eastern Shan States.

Nidification.—Exactly the same as that of *plumbipes*, and the eggs are not to be distinguished from those of the latter bird.

Habits.—So far as is recorded, there appears to be nothing to note in the habits of this bird differing in any way from those of its nearest relations. It is found alike in the Plains, and certainly up to 4,000 feet, and probably higher in the mountains. Like the other Bustard Quails also it keeps much to openings in partly forested country, and is often found in cultivation and round villages.

Turnix dussumieri.

The Little Button Quail.

Hemipodius dussumieri.—Temm. Pl. Coll., v., p. 454 (1828).
Hemipodius variabilis.—Hodg., Bengal Sport. Mag. (1837), p. 345
Hemipodius sykesi.—Smith, Ill. Zool. S. Afri., ii. (1838).
Turnix dussumieri.—Blyth, Ibis (1867), p. 161; Gould B. of Asia vii., pl. 10 (1869); Hume Str. Feath., i., p. 227; Adam, *ibid*, ii. p. 338; Ball, *ibid*, p. 428; Butler, *ibid*, iv., p. 9; Fairbank, *ibid* pp. 262, 266; Davis. and Wen., *ibid*, vii., p. 87; Hume, *ibid* pp. 186 and 226; Butler, *ibid*, p. 186; Ball, *ibid*, p. 226; Cripps *ibid*, 298; Butler, Cat. B. of Sind, p. 56; Hume and Marsh., Game B., ii., p. 193; Hume, Cat. No. 835; Vidal, Str. Feath., ix., p. 77 Butler, Cat. B. S. Bom., p. 70; Reid, Str. Feath., x., p. 64; Oates *ibid*, p. 237; Davidson, *ibid*, p. 318; Oates, B. Burmah, ii., p. 336 Hume, Str. Feath., xi, p. 312; Barnes, B. of Bom., p. 319; Ogilvie Grant, Cat. B. M., xxii., p. 540; Oates, in Hume's Nests and Eggs 2nd ed., iii., p. 371; Blanford, Avi. B. I., iv., p. 152; Oates, Game B. I., i., p. 11; Ogilvie-Grant, Game B., ii., p. 273; Le Mess Game S. & W. B., p. 114; Sharpe, Hand-List, i., p. 48; Oates, Cat Eggs, B. M., i., p. 71; Barnes, J. B. N. H. S., vi., pl. i., fig. 823 Stuart Baker, *ibid*, xii., p. 493; Moss King, *ibid*, xxi., p. 101 Whitehead, *ibid*, xxi., p. 169.

Turnix sykesi.—Jerdon, B. of I., iii., p. 600; King, J. A. S. B. xxxvii., pt. ii., p. 216; Godwin-Austen, *ibid*, xliii., pt. ii., p. 174.

Vernacular names.—Ginwa Lawa, Chota Lawa, Dabki, Tura Shimaj (*Mattra*), Libbia (*Purnea*), Darwi (*Ratnagiri*), Chinna c Tella-dabba Gandla (*Telugu*), San Gundla (*Oriya*), Choto San-sora (*Assamese*), Dao-duma kashiba (*Cachari*), Inrui-buma gajeba (*Naga*) Tutu-butera (*Sind*), Ngon (*Burmese*).

Description, adult male and female.—A distinct mesial stripe from forehead to back of crown pale buff, sides of the crown ruddy brown to brown, generally much mixed with black, whereas th

mesial stripe is often unspotted and seldom heavily marked; lores, supercilia and sides of the head white, or buffy white, speckled with black; back of the neck ferruginous red to dull ferruginous; back, rump and upper tail coverts barred black and rufous, the rufous varying from a bright tint to a dull greyish rufous, and the amount of black varying greatly in individuals; here and there, more especially on the rump, a few of the feathers are very narrowly margined with whitish, and some of the outer tail coverts have the outer webs edged with buff; the black is nearly always more strongly developed on the rump and upper tail coverts than on the back.

Scapulars, inner wing coverts, and innermost secondaries like the back, but with broad buff margins to each feather; other wing covers rufous with a black spot on the outer web, and broad buff margins, in some birds this buff margin occupying nearly all the visible portion in the closed wing; bastard wing and primary coverts grey brown with buff edges; primaries brown, or grey brown, with buff edges, broad and distinct on the outer, narrow and sometimes abraded on the inner.

Chin and throat white, centre of breast rufescent, sides of breast and flanks white or buffy white, with bold drops of black, and more or less patches of chestnut; remainder of lower parts white, often tinged buff and sometimes with chestnut, and the lower tail coverts nearly always of this colour.

Colour of the soft parts—

"Legs and feet vary from pale fleshy white to light lead colour; the bills from leaden white to lavender or plumbeous; the irides are light yellow to straw white." (Hume).

"Legs fleshy white or pale blue grey, bill the same."
(Finn in "Indian Field").

Measurements.

"Females—Length, 5·4″ to 5·7″; expanse, 9·8″ to 10·7″; wing, 2·8″ to 3·0″; tail from vent, 1·3″ to 1·5″; tarsus, 0·7″ to 0·75″; bill from gape, 0·51″ to 0·56″; weight, 1·25 to 1·5 oz."

"These measurements, taken from only 6 birds . . . probably do not adequately represent the limits within which the dimensions of this species vary."

"Males—Length, 5·2″ to 5·4″; expanse, 9·5″ to 10·5″; wing, 2·76″ to 2·9″; tail from vent, 1·25″ to 1·35″; tarsus, 0·7″ to 0·72″; bill from gape, 0·51″ to 0·55; weight, 1·1 to 1·4 oz." (Hume).

Including the birds in the British Museum, I have obtained measurements of 34 males and 43 females. The latter have an average wing measurement of 2·93″ (= 74·4 mm.) and vary in length between 2·88″ (= 7·31 mm.) and 2·98″ (= 7·57 mm.)

The former, the males, average only 2·57″ (= 5·43 mm.). In length of wing the longest is 2·80″ (=7·11 mm.), and the shortest 2·42″ (= 6·14 mm.).

Young birds.—

> "In the young birds the whole of the upper plumage is reddish brown, becoming brighter rufous on the nuchal region, and indistinctly barred with blackish brown and spotted with white, especially on the wing coverts and chest. The latter is paler buff than that of the adult, and spotted all over with black." (Ogilvie-Grant).

The nestling in down is not distinguishable from the nestling of *Turnix pugnax*.

It is quite impossible to divide this little Bustard Quail into sub-species. Two specimens from Formosa, both females, in the British Museum Collection can be picked out from the rest by their rich plumage, as can one from Sambalpur, another from the Deccan, and yet one more from East Burdwan. All these five are, however, identical, and their distribution over so scattered an area at once disposes of the question of their difference in colouration being of a subspecific value, moreover they are closely approached by a few specimens from Raipur and other parts of Central India.

It is curious to note that specimens from Pegu are rather paler than birds from other parts of Burmah, just as are specimens of *Turnix pugnax*, though these latter agree with the dark Malayan and Eastern form rather than with the South Indian ferruginous bird.

The range of variation in *Turnix dussumieri* is not nearly as great as it is in *Turnix pugnax*, and consists principally in the amount of black barring in the upper plumage, and the extent of the buff margins to the feathers of the wings and scapulars. As these are plentiful, or the reverse, so is the general aspect of the bird itself, dark or pale. The rufous of the nape and neck does not vary much in colour, though a good deal in extent, but the rufous of the upper back is often a more grey brown than a red, and this, of course, also affects the general appearance considerably.

Distribution.—This tiny Game Bird is found practically throughout India, as far South as Travancore, from the Southern part of which I have received two male specimens with their eggs. From this State it extends North in every direction as far as the Himalayas, ascending them to at least the height of 8,000 feet. It occurs in all the Hill Ranges of Assam, and I have personally often taken it in the Khasia Hills, Cachar Hills, Naga Hills, and up the Assam Valley, as far East as Dibrugarh and Sadiya. It is also found in Cachar, Sylhet, Tippera, Chittagong, and the Chittagong Hill Tracts. Further East it has been obtained by one of my native collectors in the Shan States. Oates got specimens in Pegu and Swinhoe obtained it in Formosa and Hainan.

Doubtless it will be found to occur in all the districts of Burmah, and through the lower Hill Ranges into Western China.

As regards elevation, it certainly ascends as high as 8,000 feet, as it has been found above Darjeeling, above Simla, and nearly as high on the highest peaks of North Cachar, and on the highest parts of the Nilgherries where, however, it seems to be extremely rare.

Naturally from certain parts of the country it is debarred by the heaviness and denseness of the forest, or, on the other hand, by the dryness and bareness of the plains. To the North-West it, perhaps, only wanders during the Rains, and in these parts is semi-migratory, to the extent of moving when, literally, a place becomes too hot to hold it. Elsewhere it is certainly a resident bird, breeding wherever found.

Nidification.—With this, as with the other *Turnicidæ*, the female bird is the one who courts the male, and fights with the other females for him. She is just as pugnacious as her larger relatives, and, sad to relate, is just as negligent of her maternal duties, and of her moral obligations. Until she has won her husband, she will fight for him as if he was the one and only thing she desired in this life, but her frenzy of love soon dies, and after a very short spell of wedded life, she leaves the poor little henpecked husband to hatch the four eggs she has laid, and wanders forth in search of new adventures and more husbands.

Her purr, coo, or boom, however, we may describe her call, is, I think, a good deal softer and weaker than that of the bigger Bustard Quail, but is otherwise of exactly the same description, and is uttered in the same way, and for the same purpose, *i.e.*, to call the male or to challenge another female. Captain Butler told Hume that its call was—

> "a mixture of a purr and a coo, and when uttering it a bird raises its feathers and turns and twists about much in the same way as an old cock pigeon;"

and he might have added, with the same motive, that is to say, in order to captivate its mate.

Doubtless this bird, like the others of its genus, breeds more or less throughout the whole year; but, perhaps, it is not quite so irregular as the common Bustard Quails. Generally speaking, it may be said to breed principally from April to October, and more especially from June to September. The hen must lay several clutches in the year, for she will go on breeding apparently as long as she can find husbands to hatch her eggs and bring up her young. In North Cachar I found this bird called and bred from late in April to the end of August; but in the Khasia Hills, adjoining these, she began in early April, and went on until late in September, a difference, doubtless, due to the excessive rainfall in parts

of the latter district. Davidson considered it a late breeder, and recorded:—

> "In Sholapur I got, or had brought to me, four nests, one on the 17th August, and the others at the very end of September, and I shot a hen in October, 1878, containing one unshelled egg.
>
> "In the Panch Mahals, I shot a bird containing a perfect very highly coloured egg late in October."

Theobald also found them breeding in the Punjab late in August, and near Deesa Captain A. E. Butler found eggs from the end of May to the end of August.

In Behar and Bengal, Coltart, Inglis, Hervey and others have found it breeding during the rains only, commencing at the end of June and continuing until the end of September.

The nest is similar to, and is placed in the same kind of position as that of the last bird, and requires no separate description but I do not think it is so often domed or covered in. I may have seen some 40 or 50 nests of this bird, all told, but I do not think I have seen half a dozen of this description.

The number of eggs laid is almost invariably four, and I have never seen a complete clutch with less, and only four nests with five eggs in them, and never one with six.

The ground colour of the eggs is generally greyish white, occasionally yellowish white, or still more rarely, with a faint reddish tinge. The whole surface is closely stippled or speckled and spotted with minute spots of yellowish or greyish brown, with here and there rather largish spots, and small blotches of blackish brown, in some cases a rather rich reddish brown. As a rule, these bolder markings are rather sparse and rather small, but in a few clutches they are numerous and bold, some of the blotches being as much as ·2″ in their longest diameter. Most eggs have the superior markings of all kinds fairly equally distributed over the whole surface, but in some the bolder blotches and spots form a wide zone or cap at the larger end. The secondary, or sub-surface marks are of lavender grey or pale purple, and in the shape of irregular spots and blotches, almost concealed by the surface markings.

Taking these eggs as a series, they are decidedly more boldly marked than are those of any of the other birds of the genus except the Indian Button Quail. In both of these birds clutches of eggs are not uncommon in which the whole of the surface is densely marked with comparatively large blotches of deep velvety black, giving them an unusually handsome appearance. In Karwar this seems to be the normal type of egg, and most of my clutches received from Western India from Messrs. J. Davidson, T. R. Bell, and other collectors have been of this type. In Bengal and Behar

the two types are about equal, whilst in Eastern Bengal the freckled form is that most often seen.

The shape, texture and surface of these eggs differ in no way from those of the Black-breasted Bustard Quail, though the size differs to the extent one would have expected. I have now the measurements of 42 eggs, and these run in length from ·78″ (= 19·8 mm.) to ·89″ (= 22·6 mm.), and in breadth from ·63″ (= 16·0 mm.) to ·70″ (= 17·8 mm.), the average being ·84″ (= 21·8 mm.) × ·66″ full (= 16·7 mm.).

Habits.—This little Hemipode has much the same habits, and frequents much the same kind of cover as the Common or Black-breasted Bustard Quail. It may be found in any sort of jungle, except dense evergreen forest, and even into these it wanders a little way from the wider open cultivation or grass lands. It likes bamboo jungle, especially that which is composed of small clump bamboo, which affords it excellent shelter with but little undergrowth. It is found in gardens, orchards, patches of sun grass, near tanks and ponds, and in the half-trodden down scrub jungle, which surrounds so many villages in Eastern Bengal. It may also be flushed occasionally from any kind of crop, such as hill rice, millet, wheat, or even from various Dahls, standing as high as six feet, or from young sugarcane, jute, etc. Undoubtedly, however, its favourite haunts are fairly wide stretches of sun grass, not necessarily either very long or very dense, for the little bird seems to enjoy places where it can run about with ease and freedom.

It is an inveterate little skulker, and a wonderful runner, so that it is an even harder bird to flush than its bigger relative *Turnix pugnax*. So hard is it to seduce to rise, that I have shot over wide stretches of grass for Florican and other game without seeing a single bird, though we had close lines of beaters working through with us; yet, on setting alight this same grass, the fire has forced a dozen or more of these birds to leave its shelter.

They love basking in the sun in tiny open spaces in the grass, and I have more than once come across them in some small hollow scratched in the dust or sand, in the middle of the patch, lying in luxurious ease half on their sides, with uppermost wing and leg stretched out, and eyes blinking in self-satisfied enjoyment, until they rest on the intruder, and then in a second they are off with a whirr in a headlong flight. But their flight only lasts for a few yards, and they then pitch suddenly into the grass, or cover, not to get up again, however closely one may search. I once came across a little family party thus sunning themselves in the middle of a jungle path. I was wearing rubber shoes, and had approached with complete silence, so that it was not until I had watched them for some moments that they spotted me and flew off. The young were tiny things, not half grown, but they flew as fast as the old bird, all

pitching within a few yards of where he did, and, presently, I heard the faint "cluck-cluck" of the anxious parent as he called to his chicks who, doubtless, ran to him at once, for the clucking soon stopped.

The young seem to hatch in ten to twelve days; the Cacharies say ten days, but judging from what Dr. Seth Smith says of its nearest relations, it is probably twelve. In a very short time they become wonderfully independent, and when less than a fortnight old, can fly short distances with ease and celerity, their wings looking disproportionately large in comparison to their body.

Like *T. pugnax* they eat both insects and seeds, and they are also fond of the blades of growing rice, just as it begins to spring up, for more than once I have taken these from their stomachs. Their actions while feeding are ludicrously like those of the Domestic Fowl; they scratch in the soil and bustle about from one likely spot to another, seize an ant or spider with a little run, hop up and catch a grasshopper on the wing, or turn over the soil and pebbles in search of the insects which harbour beneath them. At the same time their actions impress one as being very secretive, and they have a rather furtive look as they run about, all their energy never disturbing the complete silence.

(*To be continued.*)

SCIENTIFIC RESULTS OF THE MAMMAL SURVEY.

By Oldfield Thomas, f.r.s.

No. IX.

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A NEW PIPISTRELLE BAT FROM TENASSERIM.

Among the specimens recently obtained for the Mammal Survey of the Bombay Natural History Society by Mr. Shortridge in Tenasserim, there occurs a single specimen of the following striking species of Pipistrelle :—

Pipistrellus lophurus, sp. n.

A rather large species with a tuft of glandular hairs on the base of the tail.

Size above the average of the species of this genus. Fur of medium length, hairs of back about 5 mm. General colour, above warm bistre-brown, below rather paler than "Prout's brown," the hairs both above and below blackish-brown at their bases.

Fur not extending on to the wings above, and below only on the part close to the body. On the base of the interfemoral above, however, there is a large glandular patch of hairs, more than half an inch in diameter, the hairs radiating from a point close to the base of the tail, where there is presumably some sort of gland; the hairs themselves are about 5-6 mm. in length, uniformly brown, and more or less unctuous or sticky. On the undersurface no trace of the glandular structure is observable, the usual small triangular area at the base of the tail covered with normal hairs. Ears of medium size, their anterior base convex, roughened, and with a distinct fringe of hair; outer margin with a well-marked basal lobe. Tragus shaped as in *P. imbricatus* and its allies, broad, its greatest breadth opposite the middle of its inner margin; inner margin concave, outer strongly convex, with a large triangular basal lobe. Wings to the base of the toes. A narrow post-calcarial lobule. Tip of tail alone projecting from membrane. Penis skinned in the type, so that it is doubtful whether it has a bone or not.

Skull stout and heavily built, high, not flattened, nasal notch very broad. Anterior palatine notch especially broad, broadening out behind with a straight posterior margin. Posterior palate extended far back, its hinder margin practically entire, with scarcely a trace of a median projection. Basal pits about as in *P. imbricatus*.

Incisors subequal, the inner with a secondary subterminal cusp, the outer concave and with outer and inner marginal secondary cusps; in fact, all very much as in *P. imbricatus*. Small premolar rather large, twice as large as in *imbricatus*. Posterior

premolar with unusually large inner lobe, which projects inwards practically as far as m^1. Molars with perceptible hypocones. Lower incisors trifid, slightly overlapping, the series of the two sides meeting at an unusually sharp angle.

Dimensions of the type, the italicized measurements taken in the flesh:—

Forearm 35 mm.

Head and body 56; tail 39; ear 14; third finger, metacarpal 33, first phalanx 13; fifth finger, metacarpal 31, first phalanx 8; lower leg and hindfoot (c. u.) 21·7.

Skull, greatest length 14·1, basi-sinual length 10·1, zygomatic breadth 9, interorbital breadth 3·7, palato-sinual length 5·2, breadth of palatal emargination 2·3, mastoid breadth 7·8, height of brain case from basion 5·4, front of canine to back of m^3 3·5, front of p^4 to back of m^2 3·2.

Hab.—Maliwun, Victoria Province, S. Tenasserim.

Type.—Adult male. B. M. No. 14. 12. 1. 6. Original number 4762. Collected 5th February 1914 by G. C. Shortridge. Presented to the National Museum by the Bombay Natural History Society.

This well-marked species is probably most nearly related to *P. imbricatus* and its allies, but is at once distinguished by its unique glandular caudal tuft, its broader skull and its wider palatal emargination.

A NEW MURINE GENUS AND SPECIES FROM CEYLON.

Among the collections made in Ceylon by Major E. W. Mayor for the Mammal Survey are seventeen specimens of a small rat which proves to be not only a new species but to represent a special annectant genus, with some of the characters of *Mus* and *Leggadilla* on the one hand, and of the *Epimys* series of genera on the other. It may be called

Cœlomys*, g. n.

Molars in proportions as in *Mus*, in structure as in *Epimys*. No incisive notch or frontal ridges.

Skull on the whole like that of a small delicately built *Epimys*. Face lengthened, brain case of medium size. Supraorbital edges square, without raised ridges. Front of zygomatic plate evenly convex, a well-marked masseteric knob present near its anterior base, as in *Mus*. Palatal foramina rather short, about as in average *Epimys*, not or barely reaching the level of the front edge of the molar alveoli. Back of palate level with the posterior margin of the alveolus of m^3. Mesopterygoid fossa parallel-sided, neither

* The combination of the strictly classical origin and appearance of this name with its suggestion of the English pronunciation of Ceylon is too attractive to be resisted, even if any pretence of special applicability is a hollow mockery.

broadened anteriorly nor specially narrowed or roofed in. Bullæ of medium size.

Incisors simple, without trace of the notch on the working edge characteristic of *Mus* and *Leggadilla*. Upper molars in their respective proportions as in *Mus*, m^1 being decidedly longer than m^2 and m^3 combined. But in structure they more resemble those of *Epimys*, both in general appearance and the fact that the inner tubercle of the first lamina is but little displaced backwards. Antero-external secondary tubercle on m^2 extremely minute, practically absent and entirely absent on m^3.

External characters not peculiar. Fur fine, liberally mixed with spines. Ears of average size. Hindfoot with the fifth toe reaching nearly to the middle of the basal phalanx of the fourth; surface of sole between pads granulated, behind them smooth; sole with six distinct elevated pads, the last slightly longer than broad. Mammæ probably 3—2—10 (there are certainly three, and only three, pectoral pairs, and as both *Mus* and *Leggadilla*, with either three or four pectoral, have two inguinal pairs, the great probability is that *Cœlomys* has the same number, but they cannot be made out on the specimens available).

Genotype: CŒLOMYS MAYORI, sp. n.

This genus is of a remarkably central and annectant character, having nothing in any way special about it, but merely a mixture of the characters of the other genera, of the group. It is impossible on the one hand to put the species into any one of the older genera, and on the other to name any single character peculiar to it. Even its molars show this mixture, having the relative proportions of those of *Mus*, while the structure is more as in *Epimys*.

To show its position we may take Wroughton and Ryley's synopsis of the Indian genera of Muridæ‡, and, commencing next below *Apodemus*, alter it as follows:—

b^3 Postero-internal cusp of upper molars absent.
  a^4. M^1 longer than m^2 and m^3 combined.
    a^5. Bevelled edge of incisors notched. Palatal foramina penetrating deeply between the molars.
      a^6. Frontal ridges well marked ... *Leggadilla.*
      b^6. No frontal ridges ... ... *Mus.*
    b^5. Bevelled edge of incisors not notched. Palatal foramina shorter. No frontal ridges ... ... *Cœlomys.*
  b^4. M^1 equal to or shorter than m^2 and m^3 combined. Incisor edges not notched. Frontal ridges present.
    a^1. Front edge ... ... &c.

‡ Journ. Bom. N. H. Soc. 1913, p. 20.

Cœlomys mayori, sp. n.

Size about as in some of the smaller "Rats," such as *Epimys concolor*, larger than in any member of *Mus* or *Leggadilla*. Fur rather long (about 10 mm. on the back), fine, profusely mixed with spines, the latter not very stiff, about $\frac{1}{5}$-$\frac{1}{4}$ mm. in breadth. Colour of upper surface uniform mummy brown, hairs tipped with buffy, the spines greyish white tipped with black. Under surface soiled greyish or brownish, the hairs slaty with brown or greyish tips. Face rather darker. Ears of medium length, practically naked, grey. Hands brown to the metacarpals or basal phalanges, the terminal phalanges abruptly and prominently white; feet wholly dark brown above, or the extreme tips of the toes white. Tail ranging from rather shorter to rather longer than head and body, finely scaled (15-16 rings to the centimeter), short-haired, not pencilled, dark brown above, white below, the contrast not very sharply defined.

Dimensions of the type, measured in the flesh:—

Head and body 98 mm.; tail 102; hind foot 26 (range from 22·5); ear 17. Skull, greatest length 30; condylo-incisive length 27·5 (range from 25); zygomatic breadth 14; nasals 12·7; interorbital breadth 5; breadth of brain case 12·5; palatilar length 13; palatal foramina 5·7; upper molar series 4·4.

Hab.—Pattipola, highlands of Central Province, Ceylon, Alt. 6210.'

Type.—Old male B. M. No. 14, 12, 1, 7. Original No. 1038. Collected 25th March 1914 by Major E. W. Mayor. Presented to the National Museum by the Bombay Natural History Society. Seventeen specimens, all from the same locality.

"Trapped on the summit level, in jungle"—E. W. M.

Major Mayor is to be congratulated on his discovery of so striking an addition to the mammal fauna of Ceylon, and I have much pleasure in connecting his name with it. It is probably a very local animal, as he did not meet with it elsewhere than at Pattipola.

NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.)

BY

Lt.-Col. H. H. Harington, Indian Army.

Part III.

Family—Timeliidæ.

"Sexes alike; solitary or occurring in very small troops; not noisy; legs and feet strong; wings short and rounded; habits, skulking in bushes or on the ground; evading observation; colour of eggs, with few exceptions, spotted." (Oates).

The above is the only definition I can find which attempts to define what should constitute membership of the *Timeliidæ*, but it does not cover all the numerous genera, which at present go to make up this very mixed assembly of small birds. Many of these have nothing in common, except that they are non-migratory and consequently have short rounded wings.

However Mr. Oates's definition is very good as far as it goes, and covers a great number of genera which are thoroughly Timeliine both in structure and in habits. Others on the other hand, are just the reverse in habits, being gregarious, by no means shy or retiring, and instead of haunting the ground, frequent trees and bushes. Unfortunately these characteristics are not sufficient to divide the family, as we find nearly allied species in the same genera differing greatly in habits, some being essentially Timeliine whilst others are the reverse. This being the case in the *Alcippe*, which contains birds very similar in structure, colouration, and nidification, but differing remarkably in habits.

As many of these genera appear to grade into each other and to be nearly related, I have attempted to group them together. By so doing, I do not wish to imply that birds so grouped should belong to the same genus, but to try and show that a relationship appears to exist, and thereby possibly forming sub-families.

In some of these groups the relationship is well marked, the grading of one genus into another most noticeable. In others this is not so apparent, and I am probably wrong in grouping some together. I hope, any mistakes I have made in my attempt to sort out the "Ornithological Waste-paper Basket" may be pointed out.

Besides my attempt at Grouping, I have made out a "Key" based on that of Mr. Oates in the Fauna.

Note.—I think something should be done to give suitable English names to the numerous small "Babblers" which are included in this very large family.

Key.

A.—Wing, short, rounded, and fitting close to the body; tarsus long and strong.

a. Tail much longer than the wing.

a^1. Shafts of the feathers of the crown soft, (*i.e.*, not separable from the web).

a^2. Wing about $3\frac{1}{2}$ times length of tarsus, bill notched .. .. *Gampsorhynchus.*

b^2. Wing about $2\frac{1}{2}$ times length of tarsus, bill not notched.. .. .. .. *Pyctorhis.*

b^1. Shafts of the feathers of the crown, rigid and glistening.

c^2. Bill stout and black .. .. .. *Timeliia.*

d^2. Bill more slender, and pale coloured .. *Dumetia.*

b. Tail, equal to, or slightly shorter than, the wing.

c^1. Shafts of the feathers of the forehead soft.

e^2. Tail greatly graduated, the outer pair of tail feathers falling short of the middle pair by more than one inch.

(Bill slender and very straight) .. .. *Elaphrornis.*

f^2. Tail not greatly graduated, the outer pair of tail feathers falling short by less than one inch.

a^3. Bill stout and straight, rather deeper at the genys (middle) than at the nostrils.

a^4. Nostrils long, and protected by an overhanging membrane.

a^5. Rictal bristles very short; nostrils not overhung with hairs.

a^6. Wing and tail about equal; underplumage streaked .. *Pellorneum.*

b^6. Tail shorter than the wing; underplumage not streaked.. *Scotocichla.*

b^5. Rictal bristles well developed; nostrils overhung with hairs .. *Drymocataphus.*

c^5. Rictal bristles very long and strong; no hairs overhanging nostrils .. .. *Gypsophila.*

b^4. Nostrils, small, oval, exposed, and pierced in the anterior corner of the membrane .. .. .. *Malacocincla.* (Turdinus.)

b^3. Bill stout, culmen gently curved throughout to the tip; *bill deepest at the nostrils.*

c^4. Outer edge of the primaries uniform.

d^5. Nostrils long, and overhung by a membrane.

c^6. Small bristles overhanging the nostrils; tail less graduated, outer tail feather less than $\frac{1}{2}$ an inch shorter than middle pair .. .. *Alcippe.*

d^6. Nostrils not overhung with bristles; outer feather more than ½ inch shorter than middle pair .. .. .. *Schoeniparus.*

e^5. Nostrils, oval, exposed, pierced in the anterior corner of the membrane .. .. *Rhopocichla.*

d^4. Outer edge of the primaries conspicuously particoloured.

f^5. Nostrils not overhung by hairs.

e^6. Tail scarcely graduated. (Tail shorter than the wing.) .. *Pseudominla.*

f^6. The two outer pair of tail feather only graduated .. .. *Siva.*

g^5. Nostrils overhung with numerous small hairs. (Tail strongly graduated.)

g^6. Bill narrow; hind-claw as long as hind-toe .. .. .. *Proparus.*

h^6. Bill broad; hind-claw not long as hind-toe .. .. .. *Lioparus.*

c^3. Bill conical and sharply pointed, culmen straight. (Nostrils covered by a membrane.) .. .. .. *Stachyrhidopsis.*

d^1. Feathers of the forehead stiff shafted.

g^2. Space round the eye not naked.

d^3 A conspicuous scale overhanging the nostril .. .. *Stachyrhis* and *Thringorhina.*

f^3. Nostrils, oval, exposed, pierced in the anterior portion of the membrane .. *Mixornis.*

h^2. Space round the naked .. .. .. *Cyanoderma.*

c. Tail very much shorter than the wing. (Upper plumage squmated.)

e^1. Bill moderate and straight .. .. .. *Turdinulus* and *Corythocichla.*

f^1. Bill long and curved .. .. .. *Rimator.*

B.—Wing, long, not rounded, nor fitting close to the body.

d. Wing more than 3 times length of tarsus .. *Setaria.* (Malacopterum.)

e. Wing less than 3 times length of tarsus.

g^1. Tail more than twice tarsus .. .. *Erythrocichla.*

h^1. Tail equal to twice tarsus .. .. .. *Aethostoma.* (Trichostoma.)

GROUP I.

Gampsorhynchus.

This group consists of only one species and its geographical races; and is a most unsatisfactory one to have in the *Timeliidæ*, both on account of its size and structure. The colour of its eggs at once precludes it being placed in the *Crateropodidæ*, and as Mr. Oates says "Pending a better acquaintance, their position at present appears to be in the *Timeliinæ*."

It has the following characteristics, tail much longer than the wing and greatly graduated; a powerful hooked bill, and is chiefly noticeable for the adult having a considerable amount of white on the head, which it appears to require two years to assume.

GROUP II.

Pyctorhis.

This consists of two well-marked species, and their sub-species, which appear to form connecting links with the *Paradoxornithidæ*.

They also have a tail much longer than the wings; and a short deep bill with no notch at the tip.

One species (*P. sinensis*) consists of birds inhabiting the open country, and having a flight rather reminding one of a "Butcher-bird;" the other (*P. altirostris*) are birds only found in high grass along river banks. The eggs of the former are well known, and are some of our most beautiful Indian eggs, those of the latter, I believe, have not yet been described.

GROUP III.

Elaphrornis.

This group consists of one species, peculiar to the Island of Ceylon, which in my opinion is undoubtedly a Warbler, showing some affinities to the African *Cisticola*; and has only been temporarily included in my list.

It has the wing and tail about equal in length, the latter being greatly graduated; a slender longish bill, and the plumage very soft and dense.

GROUP IV.

Timeliia.

In this I have placed *Timeliia* which consists of one species and its geographical races, and *Dumetia*, the last being peculiar to the Peninsula of India, and consists of three sub-species.

The characteristics of this group are, tail much longer than the wing, and greatly graduated; the shafts of the feathers of the crown rigid. In *Timeliia* the bill is very stout and massive, and intensely black; whilst *Dumetia*, has a more slender bill, which is pale in colour. Both species build dome-shaped nests, which are placed near the ground, and their eggs are white covered with numerous spots.

GROUP V.

Pellorneum.

I have grouped the following together, *Pellorneum*, *Scotocichla*, *Drymocataphus*, and *Rhopocichla*, they are all thoroughly Timeliine in habits; differing from the last group, in having a shorter tail; and the shafts of the feathers of the crown soft. The type of eggs of this group, with one exception, are very like those of the last, in *Drymocataphus* the eggs are of a totally different type, being either a very bright pinkish-red, or dark greenish with dark brown spots.

GROUP VI.

Gypsophila.

This group also contains only one species, the habits and nidification of which nothing appears to be known. Its chief peculiarity is, as in *Gampsorhynchus* and *Acanthoptila*, that the adult has a considerable amount of white on the head, otherwise in structure it appears to be allied to the *Pellorneum* group.

GROUP VII.

Malacocincla (Turdinus).

This is only represented by one genus within Indian limits, others are found in the Malay Peninsula and Islands. It is thoroughly Timeliine in appearance and habits, and is characterised by its short tail and oval and exposed nostrils. The eggs of our only Indian species are very handsome and approach in colour some of the *Alcippe*.

GROUP VIII.

Alcippe.

This is rather a large group, the members of one genus grading into those of the next; in habits, they range from those which are thoroughly Timeliine, (*Schœniparus*), up to the *Sivas*, which are arboreal in habits. In it I have placed the following, *Schœniparus*, *Alcippe*, *Pseudominla*, *Proparus*, *Siva* and *Lioparus*. I have been unable to find any definite characteristics of this group, the wing and tail are about equal, that is one not conspicuously shorter than the other, and the bill, small and slightly curved. The majority build cup-shaped nests and lay highly coloured eggs.

GROUP IX.

Stachyrhis.

In this group I have placed *Thingorhina*, *Stachyrhis*, *Stachyrhidopsis*, *Mixornis*, and *Cyanoderma*. Members of the first three genera grades vary naturally from one into the other, this is most noticeable in the bill, which ranges from rather a coarse notched one in *Thingorhina*, to a slender pointed one in *Stachyrhidopsis*. The last two differ from the first in the shape and formation of their bills, but show a remarkable resemblance in their colouration and style of plumage. In habits they are not Timeliine but given to haunting trees; in nidification the first two are peculiar in being the only two genera in the *Timeliinæ* which lay spotless white eggs, the other members of this group all lay white eggs spotted with reddish.

GROUP X.

Turdinulus.

This is a very compact group consisting of the three Wren-like genera, *Turdinulus*, *Corythocichla*, and *Rimator*, the last being remarkable for its extremely long bill. The members of this group are characterised by their short tails and squmated upper plumage. In habits they appear to be very Wren-like (*Troglodytes*), haunting hillsides and brushwood, and being solitary. They all build dome-shaped nests which are placed on or near the ground, and lay white eggs profusely spotted with reddish-brown.

GROUP XI.

Setaria.

I have placed *Setaria* (*Malacopterum*), *Erythrocichla* and *Æthostoma* (*Trichostoma*) in this group, they are hardly Indian and belong really to the Malayan Fauna, only coming within our limits in the extreme south of Tenasserim. Very little has been recorded, about their habits and nidification, which might help us to their classification, and from their long wings and short tarsi, I think, should be removed from amongst the *Timeliinæ*.

They have the following characteristics, a fairly long wing, which does not fit close to the body; tail equal to or shorter than the wing, a short tarsus; bill stout, straight and very strong; rictal bristles extremely long; habits strictly arboreal.

GROUP I.

Gampsorhynchus, Blyth, 1844.

Oates, F. B. I., i., p. 134.

This group consists of one species which is confined to the eastern portion of the Empire and the Malay Peninsula, and has been divided up into three sub-species.

Their characteristics are a long graduated tail; short rounded wings, the first four primaries graduated; a powerful shrike-like bill; and their rictal bristles well developed. General colour rufous-brown with white heads and breasts; the young appear to take two years to assume the white and to breed in the immature stage.

From their structure they seem to approach the "Laughing-Thrushes" but differ from them in the colour of their eggs, which Mr. Stuart Baker has shown in one sub-species are spotted. They differ from all other Timeliides, with exception of *Gypsophila*, and *Acanthoptila*, in the young being differently coloured, and in almost the same particulars as in those two genera.

It would help immensely if specimens of this genus were sent home in spirits, so that they could be anatomically examined, and their true position determined.

GAMPSORHYNCHUS RUFULUS RUFULUS, Blyth.*

The White-headed Shrike Babbler.

Gampsorhynchus rufulus, Blyth, J. A. S. B., xiii., p. 371, 1844; Sharpe, Cat., B. M., vii., p. 386; Oates, F. B. I., p. 135; Baker, Ibis, 1895, p. 53; *ibid* Ibis, 1906, p. 96; *ibid*, J. B. M. H. S., viii., p. 179.

Description.—As in Oates, F. B. I.

Distribution.—The lower ranges and valleys of Sikhim, Sadiya and Tippook in Assam; the Daphla Hills, and Garo Hills; Arracan. (Oates). I procured two specimens at the Jade Mines in the Myitkyina District of Upper Burma, these are now in the Society Museum.

Habits and Nestings.—Mr. Stuart Baker is, I believe, the only one who has recorded anything about the nidification of this interesting species. In habits, they appear to go about in parties like Laughing-Thrushes. Their nests seem to be very untidy, cup-shaped affairs of a shrike-like appearance which are placed in bushes and saplings. The eggs "have a ground colour of very pale-yellow stone and the superior markings consist of freckles, specks, and tiny blotches of reddish-brown; these are scattered fairly numerously all over the egg, but more thickly towards the larger end, wherein two eggs they form a pretty distinct ring, and in a third an indistinct cup. The secondary markings are of the same character and distribution, but pale lavender and purple grey in colour and measured ·91″ × ·67″." †

GAMPSORHYNCHUS RUFULUS TORQUATUS, Hume.

The Ring-necked Shrike Babbler.

Gampsorhynchus torquatus, Hume, Proc. A. S. B., 1874, p. 107; Sharpe, Cat., B. M., vii., p. 387; Oates, F. B. I., i., p. 136.

Description.—As in Oates, F. B. I.

Nothing is known about the habits or nidification of this species.

Distribution.—Toungoo Hills, Karennee, and Tenasserim.

GROUP II.

PYCTORHIS, Hodgson, 1844.

This genus at present only contains two species and their geographical races, and is practically confined to the Indian Empire and Ceylon, one species *P. sinensis* extending into Yunnan and Siam.

They have the following characteristics: a small rounded wing, and long graduated tail; a short deep bill without any notch; oval and exposed nostrils and weak rectal bristles.

NOTE.

Pyctorhis gracilis, Styan, Ibis, 99. p. 295. Is only a synonym of *Moupinia pœcilotis* (Verr.), which I think should be included in this genus.

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*GAMPSORHYNCHUS RUFULUS SATURITIAR, Sharpe.

The Malay Shrike-Babbler.

Sharpe, P. Z. S., 1888, p. 273.

Habitat.—Perak. Malay Peninsula.

†[The nest of *G. rufulus* is not unlike the Shrikes of the *Voloc ivora* group, but the eggs are quite different in character, very like, in fact, *Drymocataphus tickelli* in the *Timeliinæ* and *Copsychus* amongst the *Merulidæ*.—E. C. S. B.]

KEY.

A.—Bill black; forehead plain rufous.
a. Nostrils yellow .. ..*P. s. sinensis.*
b. Nostrils black .. ..*P. s. nasalis.*

B.—Bill yellowish-brown; forehead blackish with grey margins.
c. Upper plumage reddish-brown.
a' Chin, throat and upper breast whitish .. *P. a. altirostris.*
b' Chin, throat and upper breast grey .. *P. a. griseigularis.*
d. Upper plumage earthy brown, chin and throat only white .. .. *P. a. scindicus* sub-sp. nov.

PYCTORHIS SINENSIS SINENSIS, Gm.

The Indian Yellow-eyed Babbler.

Parus sinensis. Gm., Syst. Nat., i., p. 1012 (1788).
Pyctorhis sinensis. Sharpe, Cat., B. M., vii., p. 510; Oates, F. B. I., i., p. 117
Description.—As in Oates, F. B. I.
Note.—Birds from dry localities and the plains are much paler than hill specimens, some of which are very dark and richly coloured.
Distribution.—Every portion of the Indian Empire, except south of Moulmein; it extends into Yunnan and Siam.

PYCTORHIS SINENSIS NASALIS, Legge.

The Ceylon Yellow-eyed Babbler.

Pyctorhis nasalis, Legge, A. M. N. H. (5), iii., p. 169 (1879); Sharpe, Cat., B. M., vii., p. 512; Oates, F. B. I., i., p. 138.
Description.—As in Oates, F. B. I.
Distribution.—Confined to the Island of Ceylon.

KEY TO Sub-species of *P. altirostris.*

——	*P. a. altirostris.*	*P. a. griseigularis.*	*P. a. scindicus.*
Type locality ..	Thyetmyo, Burma.	Assam	Sukkur, Sind.
Distribution ..	The Plains of Lower Burma.	The Plains of Assam and Upper Burma.	(Probably the Indus basin).
Chin and Throat..	Whitish ..	Ashy grey ..	Whitish.
Upper breast ..	Whitish ..	Ashy grey ..	Pale ochraceous.
Lower breast, flanks and abdomen.	Pale-fulvous ..	Rufous	Pale ochraceous.
Upper plumage..	Reddish-brown, darkest on the wings and tail.	Reddish-brown, darkest on the head	Fulvous; reddish-brown on the wings and tail. Head the same colour as the back.

Note.—I can find nothing recorded as to the habits or nidification of any of the above sub-species. Their distribution is also very imperfectly known, and as they inhabit dense high grass most probably have often been overlooked; their distribution is therefore most probably much wider.

Pyctorhis altirostris altirostris, Jerdon.

Jerdon's Babbler.

Chrysomma altirostre, Jerdon, Ibis, 1862, p. 22.

Pyctorhis altirostris, Sharpe, Cat., B. M., vii., p. 512; Oates, F. B. I., i., p. 139.

Description.—"Forehead and a broad stripe to the eye hoary-grey with black centres; lores grey; sides of the head and neck greyish-brown, tinged with rufous, more hoary round the eye; whole upper plumage deep reddish-brown, darkest on the wings and tail; chin, throat, cheeks, and upper breast whitish; lower breast, flanks and abdomen ochraceous." "Upper mandible pale horn-colour, lower pinkish flesh-colour; iris hazel-brown; eyelid and orbital skin greenish-yellow; legs and feet pinkish-brown." "Length, about 6·5″; tail, 3·3″; wing, 2·4″; tarsus, ·9″; bill from gape, ·55" (Oates).

Wing, 57-61 mm. Average six specimens, 60 mm.

Distribution.—Thayetmyo and the plains of Pegu, in Lower Burma.

Habits.—Nothing is known about the habits or nidification of this species, it is only found in long elephant or kine grass.

Pyctorhis altirostris griseigularis, Hume.

Hume's Babbler.

Pyctorhis griseigularis, Hume, St. Frs., v., p. 116. (1877); Harington, Bull. B. O. C., xxxiii., p. 47.

Description.—Similar to *P. a. altirostris*, Jerdon, differs, in having chin, throat, and upper breast, grey, instead of white; the lower breast, abdomen and flanks, dull rufous, instead of pale-fulvous.

Wing, 62-64. mm. Average of seven specimens, 63. mm.

"Bill pale horny, nearly white towards base of lower mandible; legs pale fleshy or orange-brown; feet darker." (Hume.)

Distribution.—Assam, and the Butan Doars.

Four specimens procured by me at Bhamo Upper Burma, in February and June, and now in the Tring Museum, are very similar to the above, in having the abdomen dull rufous and breast grey; but have the throat white instead of grey, and therefore appear to form a connecting link between the Assam and Pegu birds. I found these birds very common in the dense "Kine-grass" around Bhamo, it is probably to be found inhabiting similar localities throughout Northern Burma.

Pyctorhis altirostris scindicus, Sub-sp. nov.

The Sind Babbler.

Sharpe, Cat., B. M., vii., p. 513.

It is not always advisable to describe a new species from a single specimen, but as the only one, I have been able to examine from Sind, differs entirely from *P. a. griseigularis*, Hume, from Assam its nearest geographically, I think it advisable to give it a name. Dr. Sharpe, in the "Catalogue of Birds," notices the difference between the Sind bird and *P. altirostris*.

Description.—Similar to *P. a. altirostris*, Jerdon, from Pegu, differs in having its upper plumage fulvous, instead of reddish-brown; its chin and throat white, breast and remainder of lower plumage ochraceous.

Wing, 65. mm.; culmen, 12 mm.; bill from gape, 13. mm.

Type.—In the British Museum.

Habitat.—Sukkar in Sind.

GROUP III.

Elaphrornis, Legge, 1879.

This genus contains one species which is confined to the mountains of Ceylon. Nothing appears to be known about it and to what family or group it should belong. Mr. Oates placed it amongst the *Brachypteryginæ*, but for

what reasons he does not state. To me it appears to be more nearly allied to some of the warblers, and until it has been anotomically examined and its true position determined, afraid it must still remain amongst the miscellaneous list of *Timeliidæ*.

It has the following characteristics: a long delicate black bill equalling the hind-toe and claw in length, and perfectly straight; rictal bristles weak; no hairs overhanging the nostrils; the nostrils long narrow slits, not covered by a membrane; a rounded wing, the first four primaries graduated; wing and tail equal, the latter also very much graduated; under plumage not streaked; the whole plumage is very soft and approaching the *Luscinioła* in texture, in fact the bird looks much more a warbler than a babbler. There is also reason to believe that the young, and possibly the sexes vary, a very non-Timeliine feature.

It is hoped that members in Ceylon will collect a series of this bird and also a few specimens in spirit.

ELAPHRORNIS PALLISERI, Blyth.

Palliser's Warbler.

Brachypteryx palliseri, Blyth, T. A. S. B., xx., p. 178 (1851).

Elaphrornis palliseri, Sharpe, Cat., B. M., VII., p. 517; Oates, F. B. I., 1 p. 191; Hale, Bull. B. O. C., xxxiii., p. 91.

Description.—As in Oates, Fauna, B. I.

Distribution.—Ceylon.

Until recently nothing seems to have been known about the nidification of this interesting species, which appears to be allied to some African warblers. Mr. T. P. Aldworth was lucky enough to procure a nest with parent bird, and has given me the following note. The eggs are most remarkable, and are intermediate between those of *Tribura* and the pale type of Bulbul. In fact Mr. Stuart Baker has received eggs from Ceylon reputed to be of this species, but owing to their similarity to Bulbul's eggs, hesitated to accept them as authentic, but now thanks to Mr. Aldworth's eggs, which agree with those received by Mr. Stuart Baker, all doubt has been removed. I may add Mr. Stuart Baker has generously given me a pair of these interesting eggs.

Note by Mr. T. P. Aldworth.

"*Elaphrornis palliseri*. Pallisers' Warbler: found the nest of this bird on 10th April 1911 while it was being built, in a small shrub of the laurel family ?, at about 3 feet from the ground, situated in a small open patch, in the dense jungle on the bank of a stream flowing from the Horton Plains to the Boga-want-alawa valley. The nest which was composed of coarse grass-stalks, moss, and fine twiggs, lined with skeleton leaves and grass fibres, was deeply cupped and fairly solid. It was completed on about the 23rd. I took the two eggs on the 28th, as though I visited the nest on several occasions, I failed to see any sign of the bird until she had commenced to sit. From the construction of the nest, I was rather surprised to only get two eggs, but have since seen two more clutches, belonging to Mr. Stuart Baker, both of two eggs, so conclude this is the probable normal amount, moreover, there seems to be little variation among them, as the eggs in each of these sets were almost identical; of a pinkish-white ground colour, thickly freckled with purplish-brown, with mauve or grey under markings, and one or two hair like lines at the larger end."

GROUP IV.

TIMELIA, DUMETIA.

This group consists of *Timelia* and *Dumetia*. Their characteristics are: tail much longer than the wing, and greatly graduated; the shafts of the feathers of the crown rigid and glistening.

TIMELIA,* Horsfield, 1821.

Sharpe, Cat., B. M., vii., p. 507 ; Oates, F. B. I.,i., p. 131 ; Hartert, Nov. Zool., viii., p. 53.

This genus consists of only one species, and at present represented by three geographical races, which extend from Nepal along the Himalayas into Assam, Burma, S. China, the Malay Peninsula, and Java.

It holds the proud position of having given its name to what has been most aptly termed the "Ornithological Waste-paper Basket," for into this so-called family numerous genera have been cast, presumably because they have been refused admission to other better known ones.

They have the following characteristics: a short rounded wing, fitting close to the body ; tail much longer than the wing, and greatly graduated ; the feathers of the forehead stiff, with glistening shafts; bill coarse and intensely black.

KEY.

——	*T. p. pileata.*	*T. p. jerdoni.*	*T. p. bengalensis.*
Locality	Java	Burma	India.
Abdomen ..	Pale buff.. ..	Rusty buff ..	Fulvous, or dull buff.
Flanks	Buff tinged with olive.	Dark olive ..	Dark olive, sides of the breast very grey.
Forehead and *supercilium.*	Very narrow ..	Wider than *pileata.*	Broader than *jerdoni.*
Crown	Bright chestnut ..	Bright chestnut ..	Darker than the other two.
Upper plumage ..	Pale olive-brown...	Darker than *pileata.*	Darker than *jerdoni.*
Tail	Pale, not distinctly barred.	Ditto ..	Dark, and distinctly barred.
Wing measurements.	"67 mm. to 73 mm." (Hartert).	Average of— 13 spec. 64 mm. Max. 68 mm. Min. 61 mm.	16 spec. 61 mm. Max. 64 mm. Min. 55 mm.

* TIMELIA PILEATA PILEATA, Horsfield, 1821.

The Java Red-capped Babbler.

Horsfield, Trans. Linn. Soc., xiii., p 151 (1821) ; Sharpe, Cat., B. M., vii., p. 507 ; Hartert, Nov. Zool., viii., p. 53.

Description.—"Java birds have abdomen pale buff ; the side of the breast and flanks buffy-olive, the crown rather lighter rufous, the whole back, rump and upper tail-coverts much paler and more buffy ; the tail much paler and less distinctly barred." (Hartert.)

"Wing, 67mm. to 73 mm. (or 2·65″ to 2·87″) ; the males being larger than the females."

Habitat.—Java. There are specimens in the British Museum from Siam, Saigon and Molucca, which are, I think, referable to this sub-species.

Timelia pileata bengalensis, Godwin-Austin.

The Bengal Red-capped Babbler.

Timelia bengalensis, Godwin-Austin, J. A. S. B., xli., part 2, p. 143 (1872); Hartert, Nov. Zool., viii., p. 53; Oates, N. & Eggs, i., p. 91.

Timelia pileata, Oates, F. B. I. p. 132 (part).

Description.—"The form from the Himalayas and Assam is considerably smaller, much darker above, the tail much darker and more distinctly barred. The abdomen is of a dirty buff, the sides of the breast and flanks are deep brownish-olive. This colour extends much further towards the middle of the breast and abdomen, so that the pale area is much more restricted." (Hartert.)

"Wing 59 to 61 mm. (2·3″ to 2.4″)."

Distribution.—Along the lower hills, from Nepal to Sikhim, Bengal, Bhutan and Assam.

Habits.—Haunts damp low-lying localities. Placing its nest on or near the ground; this is composed of grass and leaves, untidily put together into a loose ball; the breeding season is from April onwards. The eggs are white profusely spotted with brown, and measure from ·69″ to ·75″ by ·55″ to ·6″.

Timelia pileata jerdoni, Walden.

The Burmese Red-capped Babbler.

Timelia jerdoni, Walden, A. M. N. H. (4), x., p. 61 (1872); Hartert, Nov. Zool., viii., p. 53; Oates, N. & Eggs, i., p. 91.

Timelia pileata, Oates, F. B. I., p. 132 (part).

Description.—"Specimens from Tenasserim are intermediate between those from Java and Northern India, they have the abdomen much more rufous, the upper plumage browner, the crown slightly darker, and the sides of the breast and flanks darker and more olive than the Java birds."

"Wing, about 67 mm. (2·65″)." (Hartert.)

Distribution.—The whole of Burma in suitable localities. I have only found this species in damp low-lying places in Upper Burma, Oates mentions that it frequents gardens in Lower Burma. Its nest and eggs are the same as the last species.

Note.—Two specimens, now in the British Museum, collected by Lieut. Vaughan, R. N., in S. China, are nearest to *T. p. jerdoni* from Burma, but are slightly smaller, and have the under parts darker, and a much more massive bill for their size.

Dumetia, Blyth, 1849.

Oates, F. of B. I., i., p. 133.

"This genus, which contains two common Indian species, resembles *Timelia*, very closely in structure, especially in the stiffness of the shafts of the feathers of the forehead and crown. The essential difference between the two genera is that in *Dumetia* the bill is much smaller, more slender and of a pale colour, and in *Timelia* larger, deeper, and black." (Oates.)

Mr. Oates in describing *D. albigularis* points out the differences between birds from the following localities: "From Mt. Abu and Deesa down to Mahableshwar the greater number of birds have nearly the whole crown deep rufous with pale shaft-streaks. In Mysore and the Wynaad the rufous is restricted to the forehead, the feathers having intensely black shafts, and all the feathers of the throat having conspicuously black shafts. Ceylonese birds resemble the Mysore and Wynaad ones, but the throat is without the black shafts so conspicuous in the latter." On examining the large series in the British Museum, I find that the birds from the first

localities are quite distinct from the others, in having the head conspicuously rufous. Birds from Ceylon have the head slightly more rufous than those from Mysore, but I do not find the black shaft stripes mentioned by Mr. Oates constant in birds from Southern India, and therefore do not consider there is sufficient variation to separate the birds from Ceylon from the Southern Indian species.

The geographical distribution, as far as I can determine, of these species is as follows: The southernmost limits of *D. hyperythra* appears to be a line somewhere between Khandala on the west and the Godavary on the east; from here it extends northwards through the Central Provinces, Chota Nagpur, the United Provinces, up to the hills as far west as Simla, and to Darjeeling on the east, wanting in Lower Bengal, but appearing on the Paresnath Hills. *D. albigularis abuensis*, sp. nov., inhabits Rajputana about Mt. Abu and Deesa, down to Mahableshwar, the exact limits at present uncertain. *D. albigularis albigularis*, Southern India from Belgaum, southwards into Mysore and the Wynaad, and to Ceylon.

KEY.

A.—Chin and throat rufous .. .. *D. hyperythra.*
B.— „ „ „ white.
a. Forehead only pale rufous .. .. .. *D. albigularis albigularis.*
b. Whole crown rufous, with pale shaft streaks *D. albigularis abuensis.*

DUMETIA HYPERYTHRA, Franklin.

The Rufous-bellied Babbler.

Timelia hyperythra, Franklin, P. Z. S., 1831, p. 118.
Dumetia hyperythra, Sharpe, Cat., B. M., vii., p. 515; Oates, F. of B. I. i., p. 133.

Description.—As in F. B. I. Birds from the Himalaya foot hills have the plumage darker, and the back with almost a greenish tinge.

DUMETIA ALBIGULARIS ALBIGULARIS, Blyth.*

The Small White-throated Babbler.

Malacocercus? albigularis, Blyth, J. A. S. B., xvi., p. 453 (1847).
Dumetia albigularis, Sharpe, Cat., B. M., vii., p. 514; Oates, F. of B. I., i., p. 134.

Description.—Forehead pale rufous; feathers round the eye white; upper plumage, wings and tail olive-brown; tail faintly cross rayed; chin and throat white, the feathers having glistening white shaft stripes; the remainder of under plumage rusty red.

"Iris, birds from Wynaad white, from Ceylon greyish-olive or white; bill, legs and feet pinkish fleshy; upper mandible along the culmen tinged with brown."

"Length, about 6″; tail, 2·7″; wing, 2·2″; tarsus, ·75″; bill from gape, ·6" (Oates)."

Distribution.—Southern India from Belgaum to Mysore and the Wynaad, and to Ceylon. In habits it seems to be a miniature *Argya*, frequenting

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* *Ophrydornis Buttikofer.*

Note in the "Hand List of Birds", Sharpe, iv. p. 87.
D. albigularis, Blyth.
This has been entered in error, and refers to *Setaria albigularis*, Blyth, and does not refer to this "*albigularis*."
The same error has been perpetuated in the *Catalogue of Nests and Eggs*, Vol. iv, p. 31.

scrub jungle and brush-wood, and going about in small parties. Nesting from April to July, building an untidy dome-shaped nest of grass and leaves on or near the ground. And laying from two to four white eggs spotted with bright red, measuring from ·66″ to ·78″ by ·5″ to ·55″.

Dumetia albigularis abuensis, sp. nov.

The Mt. Abu Babbler.

Description.—Similar to *D. a. albigularis*, Blyth. Differs in having the whole crown chestnut, instead of the forehead only being a pale rufous; and under parts much darker.

"Iris, birds from Deesa, dark brown." (Oates.)

Distribution.—The country round Mt. Abu, Deesa, and down to Mahableshwar I can find nothing recorded about birds from the above localities, but their habits most probably are the same as the last species.

GROUP V.

Pellorneum.

This group consists of *Pellorneum, Scotocichla, Drymocataphus, and Rhopocichla*, I am very doubtful about the last, whether it should be in this group at all, as the shape of its bill approaches that of the *Alcippe* type.

They have the following characteristics: feathers of the crown soft shafted; no very great difference between the length of the wings and tail; legs and feet remarkably strong; and short rounded wings, the first four primaries graduated.

N. B.—I think some of the species in this group are at present in the wrong genera.

Pellorneum, Swainson, 1831.

Cinclidia, Gould; *Hemipteron*, Hodgson.

Jerdon, ii., p. 27; Oates, F. B. I., i., p. 139.

"Bill moderate straight and compressed, and about three-fourths the length of the head, slightly hooked at the tip, and notched; the nostrils not overhung by hairs, and the rictal bristles are extremely short. The wings and tail are about equal in length; tarsus moderate; feet large; middle toe lengthened; laterals barely unequal; hind toe long; claws tolerably curved." (Oates and Jerdon.)

"Bill slender, nasal opening linear, rictal bristles short not reaching to the nostrils; tail as long as the wing, strongly rounded, about twice and a half the length of the tarsus, this latter strong at least an inch in length; toes long and strong; crown more or less rufous, bordered by a distinct paler eye-brow; lower surface, at least the chest, distinctly striped with brown."—*Buttikofer, Notes, Leyden Museum*, Vol. xvii, p. 75.

This genus has the following characteristics: a short rounded wing; fitting close to the body, the first four primaries graduated; wing and tail about equal; the feathers of the forehead soft; bill long and straight; rictal bristles very short; no hairs overhanging the nostrils; under plumage streaked.

It falls into three sub-groups, the last two are in appearance much nearer to *Drymocataphus*, and I think should be included in that genus.

i. *P. ruficeps.*

Are most noticeable for their rufous-capped heads, and under parts boldly striped with dark brown, giving them a regular "Tit-lark" appearance.

They have rather long bills which are as long as the hind-toe and claw together.

N. B.—I think this genus should be restricted to only this species.

ii. *P. palustre*, Jerdon.

Wants the rufous cap, and has the under parts streaked, but not boldly striped as in the last; the bill is shorter than the hind-toe and claw, the latter being remarkably well developed. They appear to form a connecting link between the last and *Drymocataphus*, and I think, are nearer that genus than *Pellorneum*.

iii. *P. ignotum*, Hume.

Have neither a rufous cap nor a streaked or striped lower plumage, otherwise in structure very like *P. palustre*.

N. B.—I think this species should be placed in *Drymocataphus*.

KEY.

A.—Breast boldly striped with dark brown.
  a.—Mantle not streaked.
    a^1. Crown pale rufous .. .. *P. r. ruficeps.*
    b^1. „ „ chestnut .. .. .. *P. r. subochraceum.*
    c^1. „ „ dark chestnut.. .. .. *P. r. granti.*
  b.—Mantle streaked.
    d^1. Upper back with dark brown streaks .. *P. r. mandelli.*
    e^1. „ „ „ „ „ „ .. *P. r. minus.*
B.—Breast streaked brown and greyish-buff .. *P. palustre.*
C.—Under plumage not striped or streaked.
    f^1. Breast tinged brownish .. .. .. *P. i. ignotum.*
    g^1. „ „ bright rufous .. .. *P. i. cinnamomeum.*

Distribution.—*P. r. ruficeps*, Swainson, practically the whole Peninsula of India, except the extreme South; *P. r. granti*, Harington, Travancore; *P. r. mandelli*, Blanford, from Nepal to Assam, and N. and N.-E. Burma; *P. r. minus*, Hume, Central Burma; *P. r. subochraceum*, Swinhoe, Lower Burma; *P. palustre*, Jerdon, Assam; *P. i. ignotum*, Hume, Assam; *P. i. cinnamomeum*, Rippon, Shan States, Burma.

PELLORNEUM RUFICEPS RUFICEPS, Swainson.

The Indian Spotted Babbler.

Pellorneum ruficeps, Swainson, Faun. Bor-Am. Birds, p. 487 (1831); Sharpe, Cat., B. M., vii., p. 520; Oates, F. B. I., i., p. 141; Baker, J. B. N. H. S., viii., p. 186.

Description.—Lores buff slightly tipped with black; forehead, crown, and nape rufous brown; a pale buff supercilium, and above the eye mottled with brown; whole upper plumage olive-brown; tail narrowly tipped with white; sides of the head and ear-coverts pale olive-brown or the same colour as the stripes on the breast; chin and throat white; breast white tinged with buff and boldly streaked with umber-brown; flanks and under-tail coverts olivaceous, the latter tipped with white.

Note.—Birds from Western India, Mahableshwar and the Paresnath Hills are similar to birds from Madras and the Wynaad, but have the rufous cap very much paler; the sides of the head and ear coverts buff, and no spots on the side of the head.

Distribution.—The whole of the Indian peninsula, with exception of Travancore, as far north as Khandesh and to the Paresnath Hills. Mr. Stuart

Baker, in the "Birds of N. Cachar", says that it is fairly common in North and South Cachar, and the nidification the same as *P. mandelli*.

Pellorneum ruficeps granti, Harington.

The Travancore Spotted Babbler.

P. ruficeps granti, Harington, Bull. B. O. C., xxxiii., p. 81 (1913).

"*Adult male.*—Similar to *P. ruficeps*, Swains, but altogether a much darker and more richly coloured form. Head dark chestnut; supercilium from behind the eye pale buff with dusky tips; the feathers on the forehead tipped with black; the feathers of the crown pale-shafted; the whole upper plumage, wings, and tail dark olive-brown tinged with rufous, tail not tipped white; chin and throat white; breast white with oblong spot of dark olive-brown producing a heavily streaked appearance; sides of the breast and flanks paler olive-brown; irides dark red-brown; bill above black, below horny-white; legs, feet, and claws pale fleshy. Length 178 mm.; culmen 18; wing 76; tail 66; tarsus 28.

Habitat.—Travancore.

Type in the British Museum: ♂. Mynall, 10. iii. 77. Hume coll.

Observation.—When examining the series of skins of *Pellorneum* in the Natural History Museum, I noticed that a specimen from Travancore was a much darker and more richly coloured bird than the rest. I pointed this out to Mr. Ogilvie-Grant, who kindly wrote out to the Director of the Travancore Museum for the loan of any specimens he might have. The Director most obligingly forwarded five examples of *Pellorneum* from different parts of India, and amongst them one from Travancore which is identical in colour with the one in the National Museum, and shows that the Travancore bird is undoubtedly distinct from the form found at Coonoor and further to the north. I have therefore much pleasure in naming this very well-marked sub-species after Mr. W. R. Ogilve-Grant." (Harington.)

Pellorneum ruficeps mandelli, Blanford.

The Himalayan Spotted Babbler.

Pellorneum mandelli, Blanford, J. A. S. B., xli, p. ii., p. 165 (1844); Oates F. B. I., i., p. 140; Baker, J. B. N. H. S., viii., p. 18.

P. nepalensis, Sharpe, Cat., B. M., vii., p. 518.

Similar to *S. r. ruficeps*, differs in having the mantle streaked.

Description.—Forehead and supercilium speckled with black; lower neck and upper back streaked with dark brown to black in the centre; and at the sides, the outer half of the feathers striped with the same colour as the breast stripes, the inner half striped with whitish-buff; ear-coverts pale rufous; chin and throat white; breast pale buff, heavily streaked with dark umber-brown, and occasionally a few black stripes at the side of the neck; flanks and under-tail coverts olivaceous, latter tipped white.

Note.—Many birds from Sikhim and other localities have the dark markings on the back wanting, this may be due to age.

Wing: average of 14 specimens, 70 mm.; max., 73 mm.; min., 67 mm., Males slightly the larger.

Distribution.—Nepal, Sikhim, Bhutan Doars, Assam, Dibrugarh, Khasia and Garo Hills, N. Cachar and Manipur, appearing again in the Bhamo District and extending through the Shan States. In the Museum there are 6 specimens from the Southern Shan States; these have the dark markings on the mantle, but are slightly larger, average wing 71 mm., max., 75 mm., min., 70 mm. and, I think, are referable to this species.

Habits and Nesting.—"Breeds from April to July, constructing a loose domed nest of moss, leaves, and fibres on the ground. The eggs three to four in number, are white speckled with chocolate or purplish-brown, and measure ·87″ × ·67″."

Pellorneum ruficeps minus, Hume.

The Burmese Spotted Babbler.

Pellorneum minus, Hume, S. F., i., p. 298 (1873) and iii., p. 120; Oates, F. B. I., i., p. 141 ; Baker, Records, I. M., viii., part (3), p. 263.

P. intermedium, Sharpe, Cat., B. M., vii., p. 519.

This sub-species is intermediate between *P. mandelli* and *P. subochraceum*, having the sides of the neck streaked, but not the brown markings on the back of the former. There are specimens in the British Museum, from the Chindwin, Mt. Victoria, Popa Hill, Meiktila and Thyetmyo. This is a broad belt of country between the habitats of the above two sub-species. There are also some unsexed specimens in the Museum from the Himalayas and Assam which have not the brown markings on the back typical of *P. mandelli*. These I take to be young birds. There is only one immature specimen of *P. r. ruficeps* from Cachar in the Museum. This has no traces of streaks on the upper plumage, these are, therefore, most probably only acquired at a later period.

Mr. Stuart Baker in "Birds of the Abor Expedition" is inclined to suppress this sub-species, no doubt along the border line of two nearly allied species intermediate forms must occur. In this case I think *P. minus*, Hume, has a very wide range of country, and to be entitled to sub-specific rank. The distribution of these two nearly allied sub-species is as follows:—

P. r. mandelli.—Nepal to Assam, appearing again in the Bhamo District, thence to the Shan States.

P. r. minus.—The Chindwin, Chin Hills to Mt. Victoria, Myingyan (Popa Hill), Meiktila districts, and Central Burma to Thyetmyo, whence it was first described by Hume.

Description.—Intermediate between *P. r. mandelli* and *P. r. subochraceum*, differs from the former in not having the upper back streaked with dark brown to almost black. Differs from the latter in having the feathers of the mantle and neck streaked, those of the back having pale brownish streaks, those of the side streaked with the same colour as the breast stripes.

Habits.—The same as those of *P. subochraceum* and has the same cry of "Pretty Dear" often repeated. The nest and eggs also the same, the latter being slightly larger.

Pellorneum ruficeps subochraceum, Swinhoe.

The Malayan Spotted Babbler.

Pellorneum subochraceum, Swinhoe, A. M. N. H. (4), vii., p. 259 (1871); Sharpe, Cat., B. M., vii., p. 521 ; Oates, F. B. I., i., p. Q. 142.

Similar to *P. r. ruficeps*, differs in having the crown chestnut, and being slightly smaller, and from mandelli in having the mantle not streaked.

Description.—Lore fulvous white with black shafts; forehead, crown and nape light chestnut; a broad supercilium to the nape creamy-white to buff, the feathers immediately above the eye speckled with blackish; ear-coverts pale rufous buff, with a surrounding darker line ; upper plumage, exposed parts of the wings and tail, olive-brown ; outer edge of primaries olivaceous to ochraceous ; tail narrowly tipped with white; chin and throat white; lower plumage light fulvous, flanks darker ; breast and sides of the body streaked with dark umber-brown; under tail-coverts fulvous with large central dark markings.

Wing : average of 11 specimens, 64 mm. ; max., 68 mm. ; min., 62 mm. Males slightly the larger.

Bill, "Iris red ; upper mandible dark brown, lower yellow at the base changing to light brown at the tip ; legs light brownish-yellow." (Oates.)

Distribution.—Malay Peninsula, Tenasserim, Pegu, Toungoo, the Karen Hills. (Oates).

Habits and Nesting.—A noisy little bird, keeping to dense under growth, and has a monotonous call of "Pretty dear, pretty dear," which it continuously utters throughout the breeding season. It probably has two broods during the year, nesting from March till August. Building a flimsy domed nest of grass and leaves, which is always placed on the ground, and generally well concealed amongst the fallen leaves. And lays three white eggs thickly speckled with brown, and measure ·82″ by ·62″.

Pellorneum palustre, Jerdon.

The Marsh Babbler.

Pellorneum palustre, Jerdon, Ibis, 1872, p. 300; Sharpe, Cat., B. M., vii., p. 522; Oates, F. B. I., i., p. 143; Baker, J. B. N. H. S., viii., p. 186.

Description.—As in the Fauna of India, Oates.

Habits.—"A rare bird here, and unlike the other members of the genus, never found to my knowledge outside grass land. I have never noticed near swamps or marshy land as its name would seem to infer it should be found."

Nesting.—"The nest and eggs are indistinguishable from those of *P. ruficeps* or *mandelli*, but are smaller, averaging about ·87″ by ·64″." (Baker, Birds, N. Cachar.)

Pellorneum ignotum ignotum, Hume.

The Assam Babbler.

Pellorneum ignotum, Hume, S. F., v., p. 334 (1877).

Drymocataphus ignotus, Sharpe, Cat., B. M. vii., p. 556.

Pellorneum ignotum, Oates, F. B. I., i., p. 144; Baker, J. B. N. H. S., viii., p. 186.

"Whole upper plumage rufescent olive-brown, exposed part of the wings and tail rufescent, the shafts of the feathers nowhere markedly paler; and the forehead not differing from the crown; lores and over the eye greyish-brown; ear-coverts brown with paler shafts; sides of the neck like the back; chin, throat, centre of the breast and abdomen dull white, very slightly mottled with greyish, remainder of lower plumage olive-brown tinged with rufous."

"Iris dark brown; legs and feet light sienna-grey." (Oates.)

Wing: average of 5 specimens, 57 mm.; culmen, 13 mm.; tarsus, 24 mm.

Distribution.—Assam and Naga Hills.

Nest.—A deep cup, sometimes domed, never actually on the ground and more compactly built, and from 2 to 4 feet off the ground, 2, 3 and 4 eggs laid. Eggs pale pink freckled with dark brownish-red. Measure ·72″ to ·90″ by ·57 to ·62″. Very shy and retiring.

Pellorneum ignotum cinnamomeum, Rippon.

Rippon's Babbler.

Drymocataphus cinnamomeum, Rippon, Bull., B. O. C., xi., p. 12 (1900); Harington, J. B. N. H. S., xxi, p. 115; *ibid,* Ibis, 1914, p. 11.

Description.—Upper plumage olive-brown, not rufescent; lores and round the eye ashy-grey; chin and throat whitish, with arrow like dark grey ends to the feathers; sides of the neck like the back; breast bright rufous; whitish on the abdomen; flanks olive-brown tinged with rufous.

Note.—The only specimen from Mt. Victoria is rather paler rufous on the breast, and throat not so conspicuously spotted.

Wing: average of 4 specimens, 55 mm., max., 57 mm. min., 55 mm., Culmen, 12 mm. Tarsus, 24 mm.

Distribution.—Shan States, Burma, over 5,000 ft., and Bhamo Hills.

Habits and Nesting.—I only procured one nest containing three eggs of this species, these are very similar to those of *P. ignotum.*

Scotocichla, Sharpe, 1883.

Sharpe, Cat., B. M., vii., p. 522; Buttikofer, Notes Leyden Museum, xvii., p. 94.

"Bill slender, narrow, nasal aperture linear, rictal bristles extremely short; tail graduated, nearly as long as the wing; tarsi and toes very long and stout, the first less than half the tail in length; crown darker than the back. It differs from *Drymocataphus*, which it otherwise much resembles. by the tail being more than twice the length of the tarsus; and from *Pellorneum*, under which it is ranged by Oates, by the dark cap and the absolute want of dark shaft-stripes on the lower surface." (Buttikofer.)

This genus so far only contains one species, which has the following characteristics: a short rounded wing, which fits close to the body. the first four primaries graduated; tail shorter than the wing: bill long and straight, but not as long as the hind toe and claw; rictal bristles very short; no hairs overhanging the nostrils; and under plumage not streaked. I think that the following species should be included in this group, as they all the above characteristics, and seem to be much nearer it, both in appearance and in description of plumage, than to *Drymocataphus*, *D. capistratus*, from Java, *D. captistratoides* from Borneo, and *D. nigricapatatus* from S. Tenasserim.

Scotocichla fuscicapilla, Blyth.

The Brown-capped Babbler.

Drymocataphus fuscicapillus, Blyth, J. A. S. B., xviii., p. 815 (1849).
Scotocichla fuscicapilla, Sharpe, Cat., B. M., vii., p. 523.
Pellorneum fusciciapillum, Oates, F. B. I., i., p. 143.

Description.—As in Oates, F. B. I. There are undoubtedly two races, one from the drier localities which is paler and the other darker form from damper localities.

Habitat—Ceylon. I can find nothing definite recorded as to its nidification.

Drymocataphus, Blyth, 1849.

Buttikofer, Notes, Leyden Museum, xvii., p. 74 (1895).

"This genus is easily distinguished by the following combination of characters: Bill slender, nasal aperture linear, rictal bristles wanting or feebly developed, never surpassing the nostrils, tarsus half the length of the tail, long, toes large and strong, above the eye a pale superciliary stripe."

They have the following characteristics: a short rounded wing. fitting close to the body, the first four primaries graduated; wing longer than the tail; bill straight, shorter than the hind toe; claw of hind toe long; rictal bristles well developed; nostrils overhung with hairs; under plumage not streaked.

Note.

Drymocataphus rubignosus, Walden.

Trichostoma rubigniosa, Wald., A. M. N. H. (4) xv., p. 402 (1875).
Drymocataphus rubignosus, Oates, F. B. I., i., p. 145.

See Footnote p., 339, Jour. Bom. Nat. Hist. Soc., Vol. XXIII, No. 2.
This is the young of *Pomotorhinas e. imberbis.*

Drymocataphus tickelli tickelli, Blyth.

Tickell's Babbler.

Pellorneum tickelli, Blyth, J. A. S. B., xxviii., p. 414 (1859); Sharpe, Cat., B. M., vii., p. 557; Oates, F. B. I., i., p. 146.

Trichostoma minus, Bingham, S. F., ix., p. 179.

Description.—Whole upper plumage fulvescent olive-brown; the feathers of the forehead paler, and with no tinge of olive; the feathers of the crown with pale shaft stripes; lores, a very indistinct eye-brow, and the feathers round the eye pale fulvous; ear-coverts pale fulvous-brown, with paler shaft stripes; the sides of the neck the same as the back but paler; chin, throat, and in a few birds, the centre of the breast whitish; otherwise the whole lower plumage uniformly ochraceous throughout, darker on the flanks.

"Bill dusky above, pale flesh colour beneath; iris reddish-brown; legs and feet fleshy white." (Oates).

Wing: average of 14 specimens, 61 mm., max., 64 mm., min., 57 mm. Females slightly smaller; exposed culmen, 14 mm.; tarsus, 25 mm.

Note.—Dr. Sharpe has identified *Trichostoma minus*, Hume, as being this species, there is also one of Col. Bingham's specimens, so labelled, in the Tring Museum, from Tenasserim. Col. Bingham found the nest of *T. minus*, and distinctly says that the eggs are white spotted with pink. Mr. Stuart Baker has also taken the eggs of *D. t. tickelli* in Assam, these are a pale green spotted with brown. It is most improbable that this species lays two distinct tyes of eggs, and I think it will be most probably found that the birds from Tenasserim are different to those found in Assam. In this last locality we have also another very closely allied sub-species, *D. assamensis*, Sharpe, which also lays greenish coloured eggs spotted with brown. And I think its most improbable that two so nearly allied sub-species should be found in the same locality, Mr. Oates gives the Khasia Hills as the habitat for both these species and I should not be surprised if *D. t. tickelli* and *D. t. assamensis* proved to be one and the same species.

I hope, therefore, that some one more competent than myself will settle the identity of these birds and their distribution.

Distribution.—Tenasserim, the Pegu Yomas, Karen Hills and Southern Shan States, Oates also gives the Khasia hills and Munipur.

Nesting.—Bingham, in Oates "Nest and Eggs," says, "on the 15th March I found a little domed nest made of dried bamboo leaves, and lined with fine roots, placed in a cane bush, a foot or so above the ground. It contained three tiny white eggs, with minute pink dottings chiefly at the larger end, one egg, however, is nearly pure white. I shot the little bird off the nest, which Mr. Hume identifies as this species."

Stuart Baker, J. B. N. H. S., viii., p. 189, first notices the difference between his eggs and those described by Bingham, and then describes the nest and eggs. It builds a domed shaped nest on or near the ground, and lays 3 or 4 eggs. These have the ground colour a pale greenish-grey, and the markings consist of numerous freckles and blotches of pale reddish-brown. Measuring ·77″ to ·88″ by ·58″ to ·66″.

Drymocataphus tickelli assamensis, Sharpe.

Austin's Babbler.

Drymocataphus assamensis, Sharpe, Cat., B. M., vii., p. 557 (1883); Oates, F. B. I., i., p. 147.

"This species differs from *D. tickelli*, in having the upper plumage rufescent olive-brown, and in having a longer tarsus." (Oates.)

Description.—Upper plumage rufescent olive-brown, the feathers with pale shaft stripes; outer edge of the primaries dull rufous; lores pale fulvous: sides of the neck reddish-buff; sides of the head fulvous with dark mottlings; chin, throat and breast fulvous tinged with ochraceous, in some specimens the throat is faintly mottled; flanks and abdomen dark olive-brown.

Distribution.—Khasia hills, Dollah and Sadiya in Assam.

Note.—There are numerous specimens of *D. tickelli* and *assamensis* from Assam in the Tring Museum, and I failed to notice any difference between them.

Nesting.—The nest and eggs seem to be the same as the last species.

Drymocataphus nigricapitatus, Eyton.

The Black-capped Babbler.

Bachyrpteryx nigricapitata, Eyton, P. Z. S., 1839, p. 103.

Drymocataphus nigricapitatus, Sharpe, Cat., B. M., vii., p. 554; Oates, i., p. 145.

Description.—As in Oates, F. B. I.

Distribution.—The extreme south of Tenasserim. I can find nothing recorded as to its habits or nidification.

Note.—This species has a conspicuous black cap, and appears to agree in every particular with *Scotocichla*, and I think should be placed in that genus. Its rectal bristles are very short, no hairs overhanging its nostrils, and wing slightly longer than the tail.

There are also several other so-called *Drymocataphus* from the Malay Peninsula and Island which I think should be placed in *Scotocichla*.

Rhopocichla, Oates, 1889.

Oates, F. B. I., i., p. 159.

"This genus differs from *Alcippe* in having the nostrils roundish, exposed, and pierced in the anterior part of the membrane, and in having a much shorter tail when compared to the wing. The eggs of the two genera are also different." (Oates.)

This genus is confined to Southern India and Ceylon, and forms a connecting link between *Pellorneum* and *Alcippe*, the shape of its bill being like the last, whilst its eggs and nidification are like those of the former.

They have besides the above characteristics, the usual short rounded wing; bill curved throughout and deepest at the gape, also the bill is wider than it is deep; no hairs overhanging the nostrils, and rictal bristles well developed.

Key.

(Oates, F. B. I,. i., p. 160).

a. Crown and sides of the head black .. .. .. *R. atriceps.*
b. Forehead and ear-coverts only black .. *R. nigrifrons.*
c. Ear-coverts only blackish .. .. .. *R. bourdilloni.*

Rhopocichla atriceps atriceps, Jerdon.

The Black-headed Babbler.

Brachypteryx atriceps, Jerdon, Madras Journ., L. and S., x., p. 250 (1839).
Alcippe atriceps, Sharpe, Cat., B. M., vii., p. 625.
Rhopocichla atriceps, Oates, F. B., I., p. 160.
Description.—As in Oates, F. B. I.
Distribution.—Nilgiris, and West Coast of India.

Rhopocichla atriceps bourdilloni, Hume.

Bourdillon's Babbler.

Alcippe bourdilloni, Hume, S. F., iv., pp. 399 and 485; Sharpe, Cat., B. M., vii., p. 626.

Rhopocichla bourdilloni, Oates, F. B. I., i., p. 260; Ferguson, J., B. N. H. S., xv., p. 260; Baker, Ibis, 106, p. 101.

Description.—As in Oates, F. B. I.

Distribution.—Travancore.

Its nest and eggs appear to be the same as the other two sub-species.

Rhopocichla atriceps nigrifrons, Blyth.

The Black-fronted Babbler.

Alcippe nigrifrons, Blyth, J. A. S. B., xviii. (1849); Sharpe, Cat., B. M., vii., p. 625.

Rhopocichla nigrifrons, Oates, F. B. I., i., p. 160.

Description.—As in Oates, F. B. I.

Distribution.—Ceylon.

GROUP VI.

Gypsophila, Oates, 1883.

Oates, F. B. I., i., p. 149.

"The Genus *Gypsophila* contains one remarkable bird which is confined to certain limestone mountains in Tenasserim. Its plumage is of the most extraordinary character, and even in the very large series of this bird in the Hume Collection affords no clue to its changes. For the present I locate this genus among the *Timeliinæ*, but I feel sure that this is not its proper place. Its place in the system must remain undetermined until its plumage from the young to the adult stage is properly understood.

"In structure *Gypsophila* is close to *Pellorneum* from which it differs chiefly in its longer rictal bristles and stronger bill, the upper plumage is squamated in appearance, owing to the feathers being margined with black" (Oates). It has the following characteristics: a short rounded wing, the first four primaries graduated; wing and tail about equal in length; feathers of the forehead soft; rectal bristles long and well developed; bill straight and as long as hind-toe and claw; no hairs overhanging the nostrils; in habits, however, it appears to be non-Timeliine being lively, and not at all shy, in fact appears to be very Thrush-like. Probably when the colour of its eggs are known its true position will be determined.

The name *Gypsophila* is pre-occupied in Botany, and the name *Curzonia* has been proposed, but I believe not yet adopted.

Gypsophila crispifrons, Blyth.

The Limerock Babbler.

Turdinus crispifrons, Blyth, J. A. S. B., xxiv., p. 269 (1855).

Gypsophila crispifrons, Sharpe, Cat., B. M., vii., p. 561; Oates, F. B. I., i., p. 149.

Description.—As in Oates, F. B. I.

Distribution.—So far has only been recorded from the central limestone ranges of Tenasserim. This interesting species is well worth studying, and it is hoped members station at Moulmein will try and discover its nest and eggs, besides collecting a series of its skins.

GROUP VII.

Malacocincla,* Blyth, 1845 (*Turdinus*, Blyth).

Turdinus, Blyth, 1844; Oates, F. B. I., i., p. 153.

"The genus Turdinus differs from all the other genera of this subfamily with stout straight bills in having the nostrils oval and exposed, not protected by a membrane. As restricted here, it contains but one Indian species. This has a very short tail." (Oates).

"This genus is sufficiently distinguished by the following characters:—Plumage, never mottled on upper surface which is olive-brown; flanks and undertail-coverts more or less tinged with fulvous; bill short, clumsy and rather high; nasal aperture oval and placed in front of the nasal groove, which is covered by a membrane; rictal bristles rather strong, but never reaching far beyond the nostrils; wing rounded; tail short, not fully two-thirds of the length of the wing; tarsus and toes long; especially the hind toe, tarsus fairly two-thirds of the length of the tail and longer than one-third of the length of the wing."—*Buttikofer, Notes Leyden Museum, xvii., p.* 78.

The above two descriptions of this genus are very conflicting and Oates points out the distinguishing features, namely, the exposed nostril, which has no overhanging membrane; and its short tail.

The chief other characteristics are—

A short round wing, fitting close to the body. The first four primaries graduated; tail shorter than the wing; rectal bristles well developed; no hairs overhanging the nostrils; feathers of the forehead soft, bill stout and straight, and fairly long equal to the hind toe and claw; the nostrils pierced in the membrane and exposed; no hairs overhanging the nostrils.

Malacocincla abbotti, Blyth.

Malacocincla abbotti, Blyth, T. A. S. B., xiv., p. 601 (1845).

Turdinus abbotti, Sharpe, Cat., B. M., vii., p. 277; Oates, F. B. I., i., p. 154.

Description.—As in Oates, F. B. I.

Note.—I found this bird nesting in February in Rangoon, so it possibly has two broods in the year.

GROUP VIII.

ALCIPPE.

In this sub-division of the *Timeliidæ*, I have placed the following genera: *Pseudominla*, *Schœniparus*, *Alcippe*, *Proparus*, *Siva*, and *Lioparus*. It includes birds which are both, solitary and terrestial in habits, and those which are arboreal and go about in small flocks. I have called it the "*Alcippe*" Group, as that genus may be taken as typical of the whole, half its members being purely Timeliine in habits, that is shy, solitary, and haunting the ground: the others have all the habits of *Siva*, being sociable, and going about in family parties, and frequent trees and bushes.

By placing all these genera in one group, I have no wish to do away with their generic rank, as each genus has its well marked characteristics although they appear to grade from one into the other. This, I think, may be probably due to the fact that they are still in a process of evolution, as we find each species represented by numerous geographical races.

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* The following other members of this genus are:—

M. sepiaria, Java; *M. minor*, Java and Sumatra; *M. rufiventris*, Borneo; *M. perspicillata*, Borneo.

This group has the following characteristics: wing and tail about equal in length; bill, small, stout, and gently curved; the feathers of the head ample; plumage soft and dense; and small in size.

Pseudominla. (*Sittiparus*, Oates.)

Has the tail slightly shorter than the wing, and only slightly graduated; a very small bill; and no hairs overhanging the nostrils. They are purely arboreal in habits, and appear to build dome-shaped nests, and lay spotted eggs.

Schœniparus.

Are small birds very similar to the last, with the same noticeable dark stripes on the head, but differ in having a longer and graduated tail, a stouter bill, and are terrestial in habits. They build dome-shaped nests, which are placed on or near the ground, and lay eggs remarkably like those of the English Garden-Warbler and Black-Cap. They, however, appear to grade into *Alcippe*, as *S. brunneus*, Gould, at first sight can easily be mistaken as belonging to that genus.

Alcippe.

Differs from the last two genera in having the nostrils overhung with hairs, the majority, however, have the dark stripes on the head. This genus is peculiar in containing birds very similar in plumage, but differing in habits. The eggs of all are very highly coloured and vary greatly in marking, one type is very like the eggs of the Chaffinch and Brambling, and also to the pink type of Black-Cap. I have, however, never heard of any Alcippe laying eggs with a greenish or yellow ground colour, and therefore similar to those laid by *Schœniparus*, nor any of the last laying the pink type of egg.

Proparus.

Is a well defined genus of small birds, which approach *Alcippe* in appearance, many having the conspicuous dark stripes on the head. Their characteristics are their small bill, and remarkably long hind-claw. They are only found at very high elevations, and consequently very locally distributed.

Siva.

Were placed by Mr. Oates in the *Sibiinæ*, I think the Blue-winged Sivas (*Cyanuroptera*) approaches much nearer, both in structure and appearance, to *Alcippe* and *Proparus*. They are purely arboreal in habits, and lay highly coloured blue eggs of a finch-like type. They are birds of a very handsome plumage, and are chiefly noticeable for their tail feathers which are obliquely truncated.

Liocparus.

This genus consist of only one species peculiar to the Himalayas. I have placed it in this group, but think its position doubtful, as it shows a marked relationship to *Chelidorhynx*, Hodgson, (Yellow-bellied Flycatcher). Nothing definite appears to be known about its habits or nidifications.

Pseudominla, Oates, 1894.

Pseudominla, Oates, Ibis, 194, p. 480.
Proparoides, Bianchi, Bull., B.O.C., xii., p. 55 (1902).
Sittiparus, Oates, F.B.I., i., p. 171.

Minla, Sharpe, Cat., B.M., vii., p. 606.

As the generic name *Sittiparus*, Oates, is pre-occupied Mr. Oates has proposed the above name.

It has the following characteristics: a small rounded wing; legs and feet stout; non-migratory in habits; tail slightly shorter than the wing and scarcely graduated, and the feathers of the tail pointed; bill broader than it is deep; nostrils not overhung by hairs; hind toe and bill equal in length.

KEY.

a. Head grey, a long black supercilium. ..	*P. cinerea.*
b. Head chestnut, no black supercilium, size small, wing 53—57 mm.	
a^1. Crown dark chestnut	*P. c. castaneiceps.*
b^2. Crown light chestnut.	*P. c. brunneicaudata.*
c. Head dark chestnut, size larger, wing 62—67 m.	*P. c. soror.*

PSEUDOMINLA CINEREA, Blyth.

The Dusky-green Babbler.

Minla cinerea, Blyth, J.A.S.B., xvi., p. 449 (1849); Sharpe, Cat., B.
Sittiparus cinereus, Oates, F.B.I., i., p. 171; Baker, J., B.N.H.S., viii., p. 197.

Lores, and a long supercilium yellowish-white; a black spot in front of eye, above this a broad black line extending to nape; head crown and nape, greyish washed with green, each feature broadly tipped black; upper plumage greyish-green; wings and tail brownish, washed on the outer edge with the same colour as back. Cheeks yellowish-white tipped with black; ear-coverts and sides of the neck paler than the back and more greenish; chin throat and whole lower plumage yellow, olivacious on the flanks.

Wing, 53—58 mm.; culmen, 10 mm.; tarsus, 23 mm.

Distribution.—Nepal, Sikhim and Khasia Hills.

PSEUDOMINLA CASTANEICEPS CASTANEICEPS, Hodgson.

The Chestnut-headed Babbler.

Milna castaneiceps, Hodgson, Ind. Rev., 1838, p. 38; Sharpe, Cat., B. M., vii., p. 698.

Sittaparus castaneiceps, Oates, F.B.I., i., p. 172.

Description.—Lores and forehead, yellowish-white; crown and nape, a dark chestnut-brown; the feathers of the head with pale shaft stripes; on the fore part of the crown a few feathers have the inner half whitish; a broad supercilium, and just above and below the eye white; a spot in front of the eye and a long streak behind, and a spot on the cheek black. Ear-coverts whitish, upper plumage, birds from Sikhim, Manipur, Chin Hills, are olive-green tinged with fulvous; birds from the Shan States, and the Tenasserim, olive-green with no fulvous tinge. Greater wing-coverts black, winglet white, the earliest primaries edged with greyish-white, the others and secondaries edged chestnut, tertiaries black edged olive-green; chin, throat, and breast whitish bordered with fulvous and few in distinct fulvous spots on the chin and throat; flanks and under tail-coverts olivaceous tinged with fulvous; tail slaty edged greenish on outer web.

Wing, 53—67 mm.; tail, 45 mm. culmen, 9 mm.; tarsus, 22 mm.

Distribution.—Sikhim, Naga, Manipur, and Chin Hills, Shan States and Tenasserim.

Pseudominla castaneiceps brunneicaudata, *Sharpe.

The Shillong Chestnut-headed Babbler.

Minla brunneicaudata, Sharpe, Cat., B. M., vii., p. 609.

Description.—Similar to *P. c. castaneiceps*, differs in having head much paler and more rufous; the chestnut on wings paler; tail brownish and no yellow on the forehead.

Wing, 58—62 mm.; culmen, 10 mm.; tarsus, 22 mm.

Distribution.—Shillong, Khasia Hills.

Numerous specimens in the Museum, from the above locality, all with the light-coloured head.

Note—This another well marked case of isolation in the "Assam Backwater," birds from the North and East being the last sub-species and quite distinct.

Schœniparus, Hume, 1874.

Oates, F. B. I., i., p. 168.

"With the genus Schœniparus we enter on a group of small birds with short blunt bills like the Tits, and with very strong feet. Their proper position is undoubtedly in this sub-family, both on account of their structure and their habits."

This genus differs from the *Alcippe* in having no hairs overhanging its nostrils, and in having a strongly graduated tail. Another interesting point between these two families is that *Alcippe* build cup-shaped or cradle-like nests placed well above the ground, and lay eggs of a "Chaffinch" or "Brambling" type, having a pinkish ground colour, and smears and smudges of a darker pink, and still darker spots; while *Schœniparus* all build domed nests on or near the ground, and lay eggs of the "Garden Warbler" type having a greenish or yellowish ground colour, with smears and smudges of brownish, with darker spots. They are also essential ground birds and thoroughly Timeliine in habits. They have the following characteristics: a short round wing, the first four primaries graduated; wing and tail about equal, the latter strongly graduated; a stout short bill; nostrils covered by a membrane, and not overhung by hairs; and rectal bristles weak. They also have brownish coloured heads with two conspicuous black lines, running from above the eyes to the nape.

Key.

Schœniparus consist of three species, one *S. rufigularis*, Mandelli, is confined to Assam and Manipur. Whilst the second *S. dubius*, Hume, consist of a number of local races extending from Assam into Burma and China. The third *S. brunneus*, inhabiting China, Formosa and Hainan.

a. Chestnut band across the breast .. *S. rufigularis.*

b. No „ „ „ „ „ .. *S. dubius* and sub-species.

Schœniparus rufigularis, Mandelli.

The Red-throated Tit-Babbler.

Minla rufigularis, Mandelli, S. F., i., p.416 (1873); Sharpe, Cat., B. M., vii., p. 610.

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* Pseudominla castaneiceps soror, Sharpe.

Sharpe, P. Z. S., 1887, p. 439.

"Closely allied to *M. castaneiceps*, from which it differs in its much larger size, darker olive-brown coloration, and deep chestnut, not orange, edging to the quills."

"Irides dark brown." (Sharpe.)

Wing, 67 to 62 mm.; culmen, 13 mm.; tarsus, 24 mm.

Habitat—Malay Peninsula.

Schœniparus rufigularis, Oates, F.B.I., i.,p.170 ; Baker, Ibis, 1906, p. 102.

Description—Forehead, crown, and nape, chestnut ; lores, supercilium, and immediately above the eye, white ; a conspicuous line above the white supercilium to the nape, black ; upper plumage, exposed parts of the wings and tail, olive-brown ; outer edge of the primaries fulvous ; a ring of white feathers round the eye ; ear-coverts blackish ; chin and throat white ; a conspicuous chestnut band across the bottom of the throat ; breast whitish tinged with grey ; flanks olivaceous, under tail-coverts and thighs rufous.

"Legs and feet pale yellowish horny-brown ; bill black." (Oates.) Wing, 53 to 56 mm.

Distribution.—Bhutan Duars, Daphla Hills, Naga Hills, and Manipur.

Nesting and Habits.—Mr. Stuart Baker says that this Tit-Babbler is fairly common along the foot hills in Assam up to about 3,000 ft. And that it builds a dome-shaped nest, which is placed on or near the ground, and lays 3 to 4 eggs, which have a pale yellowish ground colour with a faint tinge of green, the markings consist of clouds, blotches and spots of pale brown, above these a few dark brown dots and scrawls of a darker brown, and vary between ·70″ to ·80″ × ·51″ to ·57″.

KEY—*S. dubius* and sub-species.

—	*S. mandelli.*	*S. intermedius.*	*S. dubius.*	*S. genestieri.*
Locality, ..	Assam to the Chin Hills, W. Burma.	Bhamo Hills to the Shan States.	Tenasserim ..	Yunnan and China.
Colour of Head and Nape.	Dull golden-brown, black edges to feathers very conspicuous.	Dull golden-brown, edges of feathers only faintly darker.	Bright golden-brown, edges of feathers only faintly darker.	Dull golden-brown, which is confined to the head ; edging to feathers faint.
Sides of the Neck.	Distinctly striped, black and yellowish.	Indistinctly striped	Stripes obsolete and hidden.	Not striped.
Upper plumage..	Olive-brown ..	Olive-brown ..	Olive-brown, tinged with ochraceous.	Olive-brown.
Under plumage..	*Buff*	*Whitish*	*Whitish*	*Buff.*

S. d. dubius, mandelli, genesteiri and intermedius, differ by having a black and white double eye brow, which is black and grey in the *brunneus* group.

Note.—*S. genestieri* has no traces of stripes on the neck.

S. dubius very faint indications, which have to be looked for.

S. intermedius has very irregular stripes on the side of neck.

S. mandelli stripes very noticeable, also a very broad supercilium which converge on the back, the feathers of the back often being edged with back.

Birds from Bhamo are intermediate between *S. mandelli* and *intermedius*, but nearer the latter.

SCHŒNIPARUS DUBIUS DUBIUS, HUME.

The Tenasserim Tit-Babbler.

Proparus dubius, Hume, Proc. A.S.B., 1874., p. 109.

Minla dubius, Sharpe, Cat., B.M., vii., p. 611.

Schœniparus dubius, Oates, F.B.I., i., p. 168.

Description.—Lores dusky ; forehead, crown, and nape, golden-brown, the forehead paler ; all the feathers of the head having indistinct dark edges ; a supercilium, from just above the eye to the nape, white ; above this a border-

ing black line also to the nape, where they converge the feathers on the nape being tipped with black; ear-coverts and sides of the neck fulvous; upper plumage olive-brown tinged with ochraceous; tail tinged rufous; sides of the neck with faint indications of stripes, the inner edge of the feathers, just below the black and white supercilium, yellowish, the outer edge being the same colour as the back; chin, throat, and centre of breast, whitish; sides of breast tinged with ochraceous flanks olivaceous.

"Legs and feet fleshy; bill dull black or brown; iris sometimes yellowish-red, pale yellow, to slaty-pink." (Oates.)

Wing, 53 to 58 mm.; culmen, 12 mm.; tarsus, 25 mm.

Habits and Nesting.—As in the Fauna of India.

SCHŒNIPARUS DUBIUS MANDELLI, Godwin-Austin.

The Assam Tit-Babbler.

Schœniparus mandelli, Godwin-Austin, A.M.N.H. (4), xvii., p. 33, 1876; Oates, F.B.I., i., 169.

Minla mandelli, Sharpe, Cat., B.M., vii., p. 610.

Description.—Similar to *S. dubius*. Differs in having the feathers of the head darker, distinctly margined with black: the black supercilium more pronounced, and the upper-back streaked with black; upper plumage not tinged with ochraceous, but more olive; sides of the neck distinctly striped, the outer edges of the feathers being black, the inner rufous buff; chin, throat, centre of breast buff; ear-coverts hair brown; flanks olivaceous; and tail tinged with rufous.

Wing, from 57 to 63 mm., females slightly smaller; tail, 60 mm.; tarsus, 23 mm., culmen, 12 mm.

Legs and feet pale yellowish fleshy-brown; bill black; iris reddish-brown, red, and dark red-brown." (Oates.)

Habits and Nesting.—Its habits, nest and eggs do not seem to differ from those of *S. rufigularis*.

SCHŒNIPARUS DUBIUS INTERMEDIUS*, Rippon.

Rippon's Tit-Babbler.

Rippon, Bull., B.O.C., xi., p. 11; Harington, J.B.N.H.S., xix., p. 117.

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*SCHŒNIPARUS DUBIUS GENESTIERI, Oustalet.

Schœniparus genestieri, Oustalet, Bull., Mus., Paris, 1897, p. 210; Grant, Ibis 1900, 592.

Schœniparus variegatus, Styan, Bull., B. O. C., viii., 27.

Description.—Similar to *S. dubius*. Differs in having the forehead pale rufous, crown dull golden-brown, with very faint indications of dark edges to the feathers; nape and back olive-brown; the black supercilium not so long and not converging on the back; sides of the neck not streaked; chin, and throat whitish to buff, the sides fulvous; flanks olivaceous, thighs rufous; ear-coverts hair-brown; upper plumage and exposed portions of the wings and tail olive-brown, and not tinged with ochraceous.

Wing, 57 to 63 mm.; tarsus, 25 mm.; culmen, 11 mm.

Habitat.—Yunnan and China.

SCHŒNIPARUS BRUNNEUS BRUNNEUS, Gould.

Alcippe brunnea, Gould, P. Z. S., 1862, p. 280; Sharpe, Cat., B. M., vii., p. 624; La Touche, Ibis, 1895, pp. 311, 312, 332; *ibid*, 1898, p. 358.

Alcippe obscurior, O. Grant, Bull., B. O. C., xvi., p. 121 (1906).

Schœniparus brunneus, O. Grant, Ibis, 1907, p. 181.

Habitat.—Formosa.

SCHŒNIPARUS BRUNNEUS SUPERCILIARIS, David.

Ixulus superciliaris, David, Ann. Sci. Nat. (5), xix., Art. 9, p. 4, 1874.

Alcippe brunnea, David and Oust., Ois. Chine, p. 217.

Description.—Similar to *S. dubius.* Forehead tinged with rufous; crown, and nape dull golden brown, feathers with faint darker edges; lores dusky; ear-coverts hair-brown; upper plumage tinged olive, tail rufous; sides of the neck with faint irregular stripes, outer edge of feathers blackish, inner buffs; under parts as in *S. dubius.*

Wing, 58 to 61 mm.; tail, 60 mm.; tarsus, 24 mm.; culmen, 11 mm.

Birds from Bhamo are intermediate between this species and *mandelli* in having irregular streaks on the sides of the neck, otherwise it is nearest to *intermedius.*

Habits and Nesting.—I found this little bird fairly common up at Sinlum Kava in the Bhamo district, its nesting habits and eggs are similar to those of *mandelli.*

Alcippe, Blyth, 1844.

Oates, F. B. I., i., p. 156.

This is a very interesting genus, containing birds of very similar plumage, but totally different habits, which have often been confused.

They fall into two natural groups, one which seems to be losing its Timeliine habits and approaching *Proparus* in habits, going about in family parties hunting bushes and low trees; or still being solitary, have taken on the roll of Fly-catchers; these have a smaller bill, and more delicate legs and feet. The other group are strictly Timeliine, being solitary in their habits, and haunt bushes and undergrowth near the ground; these have a longer bill, and more powerful legs and feet.

Both have the following characteristics: a small rounded wing, the first four primaries graduated; wing and tail about equal, the latter only slightly graduated; nostrils covered by a membrane, and also overhung by hairs; a stout slightly curved bill, which is as broad as it is deep.

Key.

(*i*) Clumen about half the tarsus.. .. The *Nepalensis* Sub-Group.
(*ii*) „ more than half tarsus.. .. The *Phæocephala* Sub-Group.

A. nepalensis and its allied forms are found from Nepal to Burma, and from thence down the Malay Peninsula, and also in China and the Islands of Formosa and Hainan.

Schæniparus superciliaris, O. Grant, Ibis, 1907, p. 182.
Alcippe olivacea, Styan, Ibis, 1896, p. 312.
Schæniparus brunneus, La Touche, Ibis, 1905,
" Under these circumstances David's name of *I. superciliaris* should be retained for the Chinese form, ... it is certain that his type specimen came from Foh-kien, whence we have numerous examples." (Grant.)

Description.—Forehead, crown and nape rufous, the feathers of the forehead black tipped; a broad black line from behind the eye to the nape where they converge together on the upper back; remainder of upper plumage olive-brown; wings tinged with rufous; lores and round the eye rufous; ear-coverts pale fulvous; chin and throat whitish; breast ashy, whitish in the centre; flanks fulvous ashy.

Wing, 62 mm.; tail, 65 mm.; tarsus, 22 mm.; culmen, 11 mm.

Distribution.—China, Kuatun, Foh-kien, Ichang.

Habits.—Builds a dome-shaped nest, which is very loosely put together, and placed on the ground. Eggs, ground colour greenish, clouded and blotched with pale brown, (and from their description seem very like the eggs of *S. mandelli*), measuring ·84″ by ·62″ to ·79″ by ·62″ (La Touche).

Schœniparus brunneus argutus, Hartert.

Proparus brunneus argutus, Hartert, Nov. Zool, xviii., p. 231 (1910).
Habitat.—Hainan.

The Formosa *S. brunneus brunneus* differs strikingly by its dark undersurface, and darker brown upper plumages.

A. phœocephala and its forms extend from Southern and Western India passing through Burma to Siam and the Malay Peninsula.

The range of these two Groups overlap to a great extent, whenever this is the case, the former is only found at high elevations in the hills, while the latter only occurs at much lower levels. From their non-migratory habits, and their wide and often isolated distribution, both have developed into numerous geographical races. These, if compared singly, are often hard to separate, but if series, from different localities, are taken and placed side by side, the differences at once become apparent. A very interesting feature in both these Groups is the great similarity between the two sub-species at either extremity of their geographical areas. We have *A. morrisoniana* from Formosa much nearer in size and general appearance to *A. nepalensis* from Assam, than the latter has to *A. fratercula*, from Burma; and in the other group, *A. brucei*, from Western India is almost identical with *A. davisoni*, sub-sp. nov., from Tavoy and Mergui.

The first bird of this genus to be described was *A. nepalensis*, Hodgson (1838), a bird with a conspicuously striped head. The next was *A. phœocephala*, Jerdon (1844), a bird with no stripes on the head. The following year (1845), Blyth described *A. phayrei* from Arracan, and unfortunately compared it with both *nepalensis*, and *phœocephala*, and even went so far as to consider that the want of stripes on the head of *phayrei* denotes that it is probably the young of *nepalensis*.

"All authors have hitherto been satisfied with comparing *A. phayrei* with *A. nepalensis*, two birds which are quite distinct, both in coloration and in size, and which cannot be confounded under any circumstances" (Oates). The first *Alcippe* received by Hume from Burma were from Pegu, which he presumed to be the same as the one already described by Blyth from Arracan, and he remarks on the stripes on the head of the birds he had just received, and considered that Blyth had overlooked this feature. Later on when Hume received specimens from Tenasserim, he at once notices the absence of stripes on the heads of birds from that locality, and this time claims it as a distinguishing feature between these birds and *nepalensis*, while instead of there only being one sub-species, there were three, *A. phayrei* with no stripes on the head from Arracan, *A. magnirostis* with a striped head from Pegu, and *A. davisoni*, sp. nov., from Tenasserim. Again when *A. magnirostris*, Walden, and *A. fusca*, Godwin-Austin, were described, both were compared with the *nepalensis* group.

Nesting.—All the *Alcippe* seem to build cup-shaped nests which are placed in a fork, or a cradle-like ones suspended from twigs, placed at no great height from the ground, and composed of grass and bamboo leaves, lined with fine grass and fibres. Their eggs are of a very distinctive family type, being pinkish with numerous smudges and smears of a darker shade and may be compared to chaffinches, one, however, *A. nepalensis*, lays eggs which seems to be very liable to variation.

(1) The *Nepalensis* Sub-Group.

These birds are slightly smaller, and have a smaller and deeper bill than those in the second group; the majority have conspicuously striped heads; and all with one exception have white rings round the eye. In habits they are very tit-like, going about in parties hunting the bushes, and often behave like fly-catchers; and in India they are only found in the hills.

A. nepalensis, Hodgson, extends from Nepal to the Chin Hills on the West of Burma, and has hitherto been stated to occur in other parts of the province. I have, however, examined all the specimens in the British Museum and find all the so called *nepalensis* from Karennee and Tenasserim are *A. fratercula*.

A. fratercula, Rippon, occurs in the hills on the Eastern side of Burma, and has been recorded from the Bhamo Dist. down to the hills in Tenasserim.

A. yunnanensis, Harington—In the Museum there are a number of specimens collected by Col. Rippon in Yunnan, these are consistently larger and greyer than *A. fratercula,* and I think form a good geographical race.

A. peracensis, Sharpe, inhabits the hills of the Malay Peninsula, this sub-species is noticeable for wanting the white ring of feathers round the eye. (*N.B.*—There are also specimens of an *Alcippe* from the Malay Peninsula in the Tring Museum which are labelled *A. peracensis,* these have a decided ring of white feathers round the eye.)

A. davidi, Styan, Western China; *A. hueti,* David, Eastern China; *A. morrisoniana,* Swinhoe, the Island of Formosa; *A. cinerea,* Blyth, China; *A. rufescentior,* Hartert, Hainan.

(2) The *Phæocephala* Sub-Group.

These are larger birds than the last, and have a longer and more curved bill; two sub-species have conspicuously striped heads, and have consequently been confused with the last group; none have the white ring round the eye so noticeable in *A. nepalensis.* They are more Timeliine in their habits, frequenting the ground and dense under-growth, and the majority do not ascend the hills to any great height. Their distribution also differs from the last group; commencing from the South and West we get.

A. phæocephala, Jerdon, inhabits the hills of Southern India.

A. brucei, Hume., Western India up to Khattiwar, the Central Provinces, and the Parisnath Hills. (This sub-species is quite distinct from the first, the differences being mentioned by Oates in the F. of B. I.)

A. phayrei, Blyth, probably inhabits Assam, Arracan, and Western Burma. It was first described by Blyth from Arracan, and he particularly notes that the head is not striped. With regard to the distribution of this sub-species, I have not been able to examine sufficient specimens from the following localities so therefore cannot give its exact limits:—

Arracan: the original locality from which this species was described, the type of which, I believe, is in the Calcutta Museum.

Western Burma: there are two specimens in the British Museum, one from the Upper Chindwin, and the other from the foot of the Chin Hills; both these birds are identical. They are very grey above, have no stripes on the head, and want the rufous underparts of *A. phayrei* from Assam. From their distribution, I think, they will be found to be the same as the Arracan species, and will therefore be *A. phayrei,* but if the differences noted above hold good and are considered sufficient to constitute a geographical race, birds from Assam will be *A. fusca,* Godwin-Austin.

A. haringtoniæ, Hartert: a bird with conspicuous black stripes on the head is probably found in the whole of North-Eastern Burma. At present has only been recorded from the Bhamo Dist.; Colonel Bingham's specimens from Yatsauk, Shan States, are also referable to this sub-species. In the "Ibis," 1903, Col. Bingham notices the difference between his specimens and birds from Tenasserim, but however, confuses them with *A. fratercula* of the *nepalensis* group.

A. magnirostris, Walden: a bird with sooty brown stripes on the head, specimens in the Museum from Karennee down to about the latitude of Moulmein. This sub-species also probably occurs in the S. S. States and Siam, as Count Glydenstolpe in his "List of Birds from Siam, 1911, 1912," notes that his specimens have striped heads.

I have not been able to examine any birds from Pegu, the original locality from which Hume received his birds with a striped head. Two specimens collected by Mr. J. P. Cook in the Thayetmyo Dist. and now in the Tring Museum have striped heads, but are very much greyer than any from

Karennee, and with exception of the stripes on the head are very like the two above mentioned specimens in the Museum from Western Burma.

A. p. davisoni, sp. nov.: From the south of Moulmein and Mergui and Tavoy, we get a bird with no stripes on the head, or only very faint traces of any. These are remarkably like *A. brucei* from Western India, and as they cannot be that species I have called them after their collector.

Key to Indian Sub-species.

I. Bill small; a conspicuous white ring round the eye.
  a. Chin and throat white; flanks tinged olivaceous .. .. *A. n. nepalensis.*
  b. No white on chin and throat; flanks tinged ochraceous.
    a^1. Wing under 66·0 mm. or 2·6″ .. .. *A. n. fratercula.*
    b^1. Wing over 66·0 mm. or 2·6″ .. .. *A. n. yunnanensis.*

II. Bill large; no ring of white feathers round the eye.
  c. Head not striped.
    c^1. Lower back and rump tinged rufous .. *A. p. phœocephala.*
    d^1. No tinge of rufous on back or rump.
      a^2. Underparts tinged with rufous .. *A. p. phayrei.*
      b^2. Underparts not tinged with rufous.
        a^3. Grey of head well defined from back *A. p. davisoni.*
        b^3. Grey of head not well defined but merging into the colour of back .. *A. p. brucei.*
  d. Head and neck conspicuously striped.
    e^1. Stripes sooty brown .. .. .. *A. p. magnirostris.*
    f^1. Stripes intensely black .. .. .. *A. p. haeringtoniæ.*

Distribution.—*A. n. nepalensis*, Hodgson, Nepal, Sikkim, Butan, Assam, Manipur, Naga and Chin Hills; *A. n. fratercula*, Rippon, Eastern hills of Burma, from Bhamo to Tenasserim; *A. n. yunnanensis*, Harington, Yunnan; *A. n. daridi*, Styan, Western China; *A. n. hueti*, David, South China; *A. n. peracensis*, Sharpe, Malay Peninsula, Mt. of Perak; *A. n. cinerea*, Blyth, Malay Peninsula, and Borneo; *A. n. rufescentior*, Hartert, Hainan; *A. n. morrisoniana*, Swinhoe, Formosa; *A. p. phœocephala*, Jerdon, S. India; *A. p. brucei*, Hume, W. and Central India; *A. p. phayrei*, Blyth, Assam, Arracan, Manipur and W. Burma; *A. p. haringtoniæ*, Hartert, N.-E. Burma; *A. p. magnirostris*, Walden, Karennee and E. Burma; *A. p. davisoni*, Sub-p. Nov., Tenasserim.

Alcippe nepalensis nepalensis, Hodgson.

Hodgson's Alcippe or the Nepal Babbler.

Siva nepalensis, Hodgson, Ind. Rev., 1838, p. 89.

Alcippe nepalensis, Sharpe, Cat., B.M., vii., p. 620; Oates, F. of B. I., i., p. 157; Baker, J., B. N. H. S., viii., p. 192.

Description.—A conspicuous ring of white feathers round the eye; head, neck and upper back ashy-brown with a vinaceous tinge; a dark sooty-brown stripe on each side of the head and neck extending down to the back; ear-coverts grey; back olive-brown; exposed portions of the wings and tail yellowish-brown; chin whitish, underparts pale fulvous to olivaceous on the flanks.

Bill in the dried skin particoloured yellowish and black.

"Iris, hazel-brown; bill livid horny; the base of the upper mandible and a line along the culmen black; legs and feet livid fleshy." (Oates.)

"Length, 5″; culmen, 11mm.; wing, 2.3″; tail, 2.4″; tarsus, 8½″. (Oates.)

Distribution.—Nepal, Darjeeling, Butan, Assam, Manipur, Naga Hills, and the Chin Hills on the Western side of Burma, I have carefully examined all

the specimens in the British Museum, and the only ones of this species from Burma are those collected by Col. Rippon on Mt. Victoria; all those said to be from other localities in Burma are the next sub-species *A. fratercula*.

Habits.—I can find nothing definite about its habits. Oates says it feeds on the ground, but from the habits of its near relatives from Burma and China, I think this must be wrong. It builds a cup-shaped nest of grass and bamboo leaves and places it in a bush close to the ground. The eggs are very variable. Mr. Stuart Baker gives six distinct varieties.

(1) Pure white with minute speckles of purply-pink.
(2) The same with a pinkish ground, but large markings.
(3) The same as the last with pale pink markings.
(4) Ground colour pale to deep salmon, and more or less covered with blotches and clouds of pink, approaching the eggs of *Pyctorhis sinensis*.
(5) Gound colour pale pink to white, with spots of deep purple.
(6) In a few eggs the markings consist of almost entirely hair-like lines intertwined with one another.

Measuring: ·61″ to ·78″ by ·48″ to ·57″.

ALCIPPE NEPALENSIS FRATERCULA, Rippon.

Rippon's Alcippe or *The Shan State Babbler.*

* *Alcippe fratercula*, Rippon, Bull., B.O.C., xi., p. 11., Ibis, 1901, p. 530.

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* ALCIPPE FRATERCULA YUNNANENSIS, Harington.

The Yunnan Alcippe.

Harington, Bull., B.O.C., xxxiii., p. 63. (1913).

Similar to *A. fratercula*, Rippon, but larger; the head and neck of a much paler grey, the stripes on the head and neck being less distinct or wanting in some specimens; the underparts also are paler and of a more yellowish tinge; bill smaller.

Adult.—A ring of white feathers round the eye, head and neck pale ashy-grey; indications of two blackish stripes, one on each side of the nape and none on the head; in some specimens these are obsolete or wanting: ear-coverts of the same colour as the head; back pale olive brown; underparts pale ochraceous, tinged with olivaceous on the flanks.

"Iris crimson, upper mandible dark horn-colour, lower mandible like the feet legs and feet livid horn-colour." (Rippon.)

Culmen, 10 mm.; wing, 69.

In *A. fratercula*, culmen, 11 mm.; wing, 62 to 66.

Habitat.—Mountains of Yunnan, from 8,00010,000 ft.

Observation.—There are several examples in the British Museum from the above locality collected by Col. G. Rippon.

Type in the British Museum: Adult. Gyi-dzin-shan, east of Talifu, 8,900 ft., 2. iv.02. G. Rippon coll. (Harington.)

ALCIPPE NEPALENSIS HUETI, David.

David's Alcippe.

David, Ann. Sci. Nat. (5). xix., Art. 9, 1874; Styan, Ibis, 1896, p. 309; La Touche, Ibis, 1899, p. 185; La Touche, Ibis, 1905, p. 29.

Description.—A ring of white feathers round the eye; head and neck a decided grey; the stripes on head and neck very faint or wanting; chin and throat grey; upper plumage olive-brown; flanks and under tail-coverts sandy buff.

Average wing measurement of 4 males, 65 mm. or 2·55″, max., 69 mm. or 2·7″, min., 63 mm. or 2·47″. Bill 11 mm. or .45.

Habitat.—Fokien Province, China.

Nesting and Habits.—It seems to be only found in the mountains of China, where it haunts low-trees and bushes going about in flocks. It builds a cradle-like nest slung from twigs at no great height from the ground, and lays eggs, having a pinkish ground colour, covered with darker smudges and smears, with purplish spots and streaks, in fact very much of the same description as *A. phayrei* or *phæocephala*.

Description.—A ring of white feathers round the eye, but not quite so conspicuous as in *A. nepalensis*; head and neck ashy-grey; with no vinaceous tinge: a well defined blackish stripe on both sides of the head and neck extending down to the back; ear-coverts grey; back olive-brown; the exposed parts of the wings and tail yellowish-brown; or the same colour as the back; underparts rich ochraceous, no white on the chin. "Iris crimson, the legs and bill horn-colour." Bill all of one colour. "Length, about 5.8"; wing, 2.65"; tail, 2.6"; tarsus, .8" (Rippon.) Average wing measurement of 7 unsexed specimens, 64 mm. or 2.5", max., 66 mm. or 2.6", min., 62 mm. or 2.45". Bill 11 mm. or .45".

ALCIPPE NEPALENSIS DAVIDI, Styan.

Styan's Alcippe.

Styan, Ibis, 1896, p. 310.
La Touche, Ibis, 1905.

Description.—A ring of white feathers round the eye; head and neck a light ashy-grey: stripes on head and neck wanting or obsolete; chin and throat grey; breast whitish; flanks and under tail-coverts olivaceous; upper plumage olive-brown.

Wing measurement, male, 68 mm. or 2·68"; female, 67 mm. or 2·64". Bill 12 mm. or ·45".

Habitat.—Western China.

ALCIPPE HUETI MORRISONIANA, Swinhoe.

The Formosa Alcippe.

Sharpe, Cat., B. M., vii., p. 621.
Bill, 10-11mm. or ·45".

STYAN, IBIS, 1896., p. 311.

Sub-species.	*Flanks and under-tail coverts.*	*Breast.*	*Throat.*	*Supercilium.*
A. nepalensis ...	Olivaceous ...	Light buff ...	White ...	Very distinct.
A. davidi	Do. ...	Do. ...	Grey ...	Very faint.
A. hueti	Sandy buff ...	Light vinous buff.	Do. ...	Faint.
A. morrisonia ...	Do. ...	Light sandy buff.	White ...	Distinct.

Distribution.—*A. davidi*, Western China; *A. hueti.*, Fukien Province; *A. morrisonia*, Formosa.

ALCIPPE NEPALENSIS PERACENSIS, Sharpe.

Sharpe's Alcippe.

Sharpe, P. Z. S., 1887, p. 439.
Distribution.—The mountains of Perak, Malay Peninsula.
"Male. Irides brown. This bird is common on the higher parts of the hills. It has a loud and musical song."

ALCIPPE NEPALENSIS CINEREA, Blyth.

Blyth, J. A. S. B., xiii., p. 384 (1849); Sharpe, Cat., B. M., vii, p. 622.
Distribution.—Malacca, Malay Peninsula; and Borneo.

ALCIPPE NEPALENSIS RUFESCENTIOR, Hartert.

Proparus nepalensis rufescentior, Hartert, Nov. Zool., xvii., p. 231 (1910).
Habitat.—Island of Hainan

Birds from Tenasserim are slightly smaller, and are inclined to be rufous on the wing. Average wing measurement of 6 ♂ ♂, 62 mm. or 2.45″., max., 64mm. or 2.5″., min., 61 mm. or 2.39″. Of 4 ♀ ♀, 60 mm. or 2.36″., max., 61mm. or 2.35″., min., 58 mm. or 2.27″.

Distribution.—From the Bhamo Hills, through the Shan States and Karennee, down to Tenasserim, in the hills only. Davison mentions that he only met with this species (*nepalensis*) in the hills of Tenasserim while *A. davisoni* (*phayrei*) inhabits the low country.

Habits.—I found this a very noisy and inquisitive little bird, and not at all shy and retiring like the great majority of small babblers. "Its habits are those of a Fly-catcher, and it seldom descends to the undergrowth, but takes up a position and thence makes short sallies in order to catch flies, precisely in the same manner as the small Fly-catcher do. It is common to find pairs a little distance apart, frequently uttering their call, which consist of five notes, and is loud for the size of the bird." (Rippon.)

Nest and Eggs.—Its nest seem to be similar to that of *A. nepalensis*, those found by me in the Bhamo Hills were composed of either leaves and grass or moss, and were lined with some kind of red fibre, and measured 4″ by 1½″, and were placed from two to four feet from the ground. All my eggs were of one type, having a white ground colour profusely spotted with rusty red, and measured ·87″ by ·58″ to ·77″ by ·57″. The eggs of this species most probably vary in the same manner as those of *A. nepalensis*, as Mr. Stuart Baker informs me that he has received eggs from Burma similar to those of that species.

Alcippe phæocephala phæocephala, Jerdon.

The Nilghiri Quaker-Thrush.

Thimalia poioicephala, Jerdon, Madras Journ., L.S., xiii., p. 169 (1844).

A. phæocephala, Sharpe, Cat., B.M., vii., p. 622; Oates, F. of B.I., i., p. 158.

Description.—Head and neck brownish ashy-grey; ear-coverts hair-brown; back brownish olive-brown, tinged with grey on the upper portion, and with rufous on the rump and upper tail-coverts; outer edge of primaries and tail chestnut; chin and throat greyish-buff; breast and under parts ochraceous buff.

Average wing measurement of 10 specimens, 68 mm. or 2·68″, max. 69 mm. or 2·69″, min., 67 mm. or 2·64″. Bill, 14 mm. or ·55″.

"Iris slaty-grey; legs, feet greyish fleshy, bill horny-brown." (Oates.)

Distribution.—Hills of Southern India, Nilghiris, Coonoor, the Wynaad and Travancore.

Note.—This is a very rufous species, and easily distinguishable from birds of the Western Ghats.

Habits.—I can find nothing recorded as to the habits of this species, it ascends the hills to 5,000 ft., a height to which none of the others of this group venture upto.

The eggs are delicate pink with a few large conspicuous smudges of darker pink, and dark red spots, and hair-like lines of almost black and measure from ·75″ to ·86″ by ·58″ to ·65″.

Alcippe phæocephala brucei, Hume.

The Bombay Quaker-Thrush.

Alcippe brucei, Hume, J. A. S. B., xxxix. pt. ii., p. 122 (1870); Harington, Bull., B.O.C., xxxiii., p. 61 (1913).

"This sub-species was first described by Fairbank, who forwarded his description to A. O. Hume. The latter, however, does not appear to have

published it, but refers to the bird from Mahableshwar under the name of *Alcippe brucei*, and notes that it is slightly larger than *A. phæocephala*.

Oates in the 'Fauna of India, Birds,' i., p. 158, also notes that birds from the Nilghiris and Travancore differ from those found in other localities.

Adult.—Larger and much greyer than *A. phæocephala*, Jerdon, and lacking the rufous tinge on the plumage of the upper parts. Head and neck ashy-grey, paler, and not so well-defined as in *A. phæocephala*, and merging into the colour of the back; upper plumage greyish olive-brown, with no rufous tinge; outer edges of the primary-quills and tail-feathers light brown instead of chestnut; lower plumage as in *A. phæocephala*. Wing, 70-74 mm.; average measurement, 72.

Habitat.—Mahableshwar, the Western Ghats from Rajkote in Khattiwar to Belgaum; the Central Provinces; Pachmari; and the Paresnath Hills, Lower Bengal.

Type in the British Museum: ♂. Mahableshwar, 22. iii., 73 (*Rev. S. B. Fairbank*). Hume coll." (Harington.)

Bill, 4-15 mm.; (note a bird from Rajkote, Khattiwar, is the largest, having a wing of 75. mm.)

ALCIPPE PHÆCEPHALA PHAYREI, Blyth.

The Arracan Quaker-Thrush.

Alcippe phayrei, Blyth, J. A. S. B., xiv., p. 601 (1845); Sharpe, Cat. B. M., vii., p. 623; Oates, F. of B. I., i., p. 158.

A. fusca, Godwin-Austin, J. A. S. B., xlv., p. 197.

As there has been a great deal of confusion over the description of this species, I give Blyth's original description and note.

Blyth's Birds of Burma, p. 601.

A. nepalensis.

Alcippe phayrei, Nobis, J. A. S. B., xiv., p. 601.

"The present one is most nearly allied to *A. poicephala*, Jerdon, and also *Siva nepalensis*, Hodgson ....But is distinguished by its less rufescent hue, especially on the tail, and its upper and lower coverts, which are devoid of such a tinge, or the upper tail-coverts retain it only in a very slight degree. .... lower parts fulvescent whitish, whitish on the throat and middle of the belly."

"*Habitat.*—Arracan."

"Wanting the dark sincipital stripes is probably the young."

From the above description it is most noticeable that *A. phayrei* has not a striped head, and also has no rufous tinge on the lower plumage. Unfortunately there are no specimens of *A. phayrei* from Arracan in the Museum, the * type being in the Calcutta Museum. There are, however, two specimens in the British Museum from the Western side of Burma, one from Saw in the Pokokko Dist.; and the other from the Upper Chindwin Dist., where it appears to be common (Oates and Mears, J. B. N. H. S., xviii., p. 80), these are much greyer above than any Assamese birds I have seen, and also want the decided rufous tinge so noticeable in birds from those parts, and in my opinion appear to be much nearer to Blyth's description than the Assam birds, also geographically they are much nearer to Arracan, at present it is impossible to say, whether birds from Assam are *A. phayrei*, or should be *A. fusca* (the type of which is in the Museum, and agree with all other specimens from Assam). If the birds from Assam and

* I have just examined the type specimens of *A. phayrei*, Blyth, from Arracan, kindly forwarded by Dr. Annandale for comparison, these unfortunately are very worn and faded, so that it is impossible to say whether Arracan and Assam birds are identical. It is hoped that any members in Arracan will collect and forward specimens to decide the point. H. H. H. Bombay, 7th March 1914.

Arracan are identical, those from Western Burma will require naming. Mr. Stuart Baker in his "Birds of N. Cachar," J., B. N. H. S., viii., p. 193, seems doubtful about his specimens from that locality, considering them intermediate between the Burmese and the S. Indian forms. by splitting them up into geographical races, I think the variations will be found to be constant.

Description of Birds from Western Burma—

Head and neck light ashy-grey, merging into the upper back; lower back and rump pale olive-grey; ear-coverts pale greyish-brown; chin and throat whitish; breast pale fulvous, flanks tinged with olivaceous.

Wing, sex ? 66 mm. or 2·6." Female, 65 mm. or 2·55." Bill, 14. mm.

Description of Birds from Assam—

Head and neck dull brownish-grey, merging into the colour of the back; ear-coverts browner; the remainder of the upper plumage olive-brown; the exposed portion of the wings and tail yellowish-brown; chin and throat greyish; breast and under plumage ochraceous with a decided rufous tinge.

Wing: 3 ♂ ♂, average 70 mm. (2-75"), [Max. 72 mm., min. 68 mm.]; 2 ♀ ♀, 66 mm. (2·6"); 4 unsexed, 68 mm. (2·68"). Bill, 14-15 mm.

Alcippe phæocephala haringtoniæ, Hartert.

The Upper Burma Quaker-Thrush.

Hartert, Bull., B. O. C., xxv., p. 10.

Description.—Head and neck ashy grey; two conspicuous black lines on each side of the head and neck extending down to the upper back where they converge; ear-coverts light hair brown; back and upper plumage olive-brown; outer edge of primaries and tail yellowish-brown; chin, throat and underparts ochraceous buff, to olivaceous on the flanks.

Wing measurement of 6 specimens, average 67 mm. or 2·64", max., 70 mm. or 2·75.", min., 65 mm. or 2·55." Bill, 12-13 mm.

Distribution.—Probably the whole of N.-E. Upper Burma and the Northern parts of the Shan States. Both Dr. Anderson's and my specimens were procured in the Bhamo Dist. There are also two of Col. Bingham's specimens, from Yatsauk, Shan States, which are referable to this species, to which he draws attention in the *Ibis*, 1903, p. 589.

I only met with this species in the plains near Bhamo itself, and not in the hills where *A. fratercula* is very plentiful.

Alcippe phæocephala magnirostris, Walden.

The Lower Burma Quaker-Thrush.

Alcippe magnirostris, Walden, Blyth's Birds of Burma, p. 115 (1875).

A. phayrii, Sharpe, Cat., B. M., vii., p. 623; Oates, F. of B. I., i., p. 158.

Description.—Head and neck brownish-grey almost ashy, and well defined from the back; two sooty-brown stripes on each side of the head and neck extending down to the back: ear-coverts greyish-brown; remainder of upper plumage olive-brown tinged with grey on the back; exposed portions of the wings and tail yellowish-brown; throat whitish, underparts ochraceous buff.

Type from Karennee is in the British Museum.

Wing measurement of 6 males; average 71 mm. or 2·8", max., 73 mm. or 2·85," min., 69 mm. or 2·67". Female, 70 mm. or 2·7". Culmen, 13 mm.

Distribution.—Most probably Siam, S. S. States, Karennee, and S.-E. Burma to just north of Moulmein.

Hume, Stray Feathers, iii., p. 116.. "*Birds from Pegu.*"

"....but in one respect it more closely resembles *nepalensis*, a point which appears to have been overlooked, in that it exhibits the *same sort of dark streaks running backwards on either side of the nape that nepalensis does*, only in *phayrei* it is less strongly marked."

ALCIPPE PHÆOCEPHALA DAVISONI, sp. nov.

The Tenasserim Quaker-Thrush.

Similar to *A. magnirostris*, from Karennee, but the stripes on the head are entirely wanting or only very faint indications of them; also very similar to *A. brucei* from Western India, but is much darker.

Description.—Head and neck ashy brown well defined from the back; stripes on head wanting or only faint indications; ear-coverts hair-brown; chin and throat whitish; under parts ochraceous, flanks olivaceous.

Wing measurement: males, average 71 mm. or 2·8″, max., 73 mm. or 2·85,″ min., 68 mm. or 2·68.″ Female, 70 mm. or 2·7.″ Bill, upper mandible horn, lower yellowish. Culmen, 13 to 14 mm. or "Iris slaty-grey to slaty-yellow."

Hume, Str. Frs., vi., p. 260 "*Birds of Tenasserim.*"

In pointing out the differences between *A. phayrei* and *nepalensis*, says, "*Phayrei* may be distinguished at once from *nepalensis* by its larger size, much larger bill, browner ear-coverts, *and by the almost entire want in most specimens, and the comparatively feeble trace in the rest, of the very conspicuous black sinocipital stripes which characterize nepalensis.*

Distribution.—Tavoy, Mergui and to the south, the dividing line between this sub-species and *magnirostris* is about the latitude of Moulmein, birds to the south of this show very little signs of any stripes on the head, and further south none whatever.

Habits.—Occurs throughout the province, only in the low hills.

Nests within a few feet of the ground at low elevations, eggs in the Museum (*phayrei* from Tenasserim) are pinkish-white, blotched and streaked with reddish-pink, and with faint spots of purple. Measuring ·68″ to ·78″ by ·53″ to ·59″.

(*To be continued.*)

A REVIEW OF THE INDIAN SWANS.

BY

E. C. Stuart Baker, F.Z.S., F.L.S. and M.B.O.U.

(*With a Plate.*)

In 1897 when writing a series of articles on "Indian Ducks and their Allies," it was very doubtful what species of swans had been obtained in India, but I then accepted records of *Cygnus musicus*, *C. bewicki* and *C. olor*. Of these, however, the second had to be eliminated as Blanford showed that the head and feet, hitherto supposed to have belonged to this species, were really those of *musicus*. Ten years later, in 1908, when these articles to which I refer, appeared in book form, there were therefore only two species of swans, *i.e.*, *musicus* and *olor*, the Whooper and the Mute Swan, which had been authenticated as having occurred in India. Since then a great deal more information has been obtained on the occurrence of swans in that country and, in addition to this, Alpheraky has described a new Eastern form under the name *jankowskii*; it seems, therefore, desirable to again examine the question of what swans have occurred in India and at the same time it may be useful to summarise all information up-to-date and give a key to the species. The correct name for *Cygnus musicus* is *Cygnus cygnus*, and will be used hereafter in this article.

Key to the Species.

A.—Lores and triangular patch between forehead and gape yellow or orange yellow, never black. No knob at base of bill.

a. Yellow on bill extending right up to the nostril and sometimes still further towards tip of bill ... *cygnus*.

b. Yellow never reaching to nostril and generally confined to somewhat circular patch on base.

a. Bill longer, broader but less high at the base in comparison. Serrations on bill hardly visible when closed. *jankowskii*.

b. Bill shorter, not so broad but comparatively high at base. Serrations visible along whole length of bill when closed ... ... *bewicki*.

B.—Lores and triangular patch black. A knob at base of bill in adults... ... ... *olor*.

Half Nat. size

1. BEWICK'S SWAN. *C. bewicki.*
2. ALPHERAKY'S SWAN. *C. jankowskii.*
3. THE WHOOPER. *C. cygnus.*
4. THE MUTE SWAN. *C. olor.*

Cygnus cygnus (Linn.).

The Whooper.

Anas cygnus.—Linn. Syst. Nat. 1, p. 122 (1758); *ibid*, 1, p. 194 (1766); Lath. Ind. Orn. ii, p. 893 (1790).

Cygnus ferus.—Briss. Orn. vi, p. 292; pl. xxviii (1760); *Cygnus musicus*, Bechstein, Gem. naturg. Vög. Deutschl. iii, p. 830, pl. 35 (1809); G. R. Gray, Cat. Mamm, etc. Coll. Hodgs. 1846, p. 144; Brooks, P. A. S. B., 1872, p. 63; Hume, Str. Feath. vii, pp. 106, 107, 464; viii, p. 114; *id.* Cat. No. 944 quat. Hume & Marsh. Game B. Ind. iii, p. 47. Plate (1880); Salvadori, Cat. B. M. xxvii, p. 27 (1895); Stuart Baker, J. B. N. H. S. xl, p. ii (1897); Blanford, *ibid*, p. 306 (1898); Aitken, *ibid*, xiii, p. 362; Crerar, *ibid*, xv, p. 716 (1903); Cumming, *ibid*, xvi, p. 697; Makin, Ibis, 1906, p. 398; Annandale, *ibid*, p. 612; Buturlin, *ibid*, p. 737; Thomson, *ibid*, 1907, p. 511; Buturlin, *ibid*, p. 651; Stuart Baker: "Indian Ducks and their Allies," p. 12 (1908); *id*, J. B. N. H. S. xviii, p. 754 (1908); *id*, *ibid*, xxi, p. 274 (1911).

Cygnus bewicki.—Hume & Marsh. Game B. Ind. iii, p. 51 (in err.) (1880); Stuart Baker, J. B. N. H. S. xi, p. 14 (in err.) (1897); Salvadori, Cat. B. M. xxvii, p. 29 (1895); (part specimen "M.")

Cygnus cygnus.—Sharpe Hand.-L. 1. p. 207.

Description.—*Cygnus cygnus* can be discriminated from the other swans which have yellow lores by its much greater size when adult, the wing being never under 22·5″ (570 mm.) and generally a good deal more. The bill is not only actually, but is also comparatively longer in adult birds, being very seldom as little as 3·9″ (100 mm.) and generally well over 4″ (102 mm.). In shape also it differs greatly, the upper outline running almost straight from the tip to the base at forehead, which is, comparatively, not nearly so deep as in *bewicki*. In colouration the yellow on the base of the bill in the "Whooper" extends right down to the upper corner of the nostril and open beyond this; the outline between the yellow and black is generally very ragged, the colours running into one another though not fusing into an intermediate tint.

The serrations in the upper mandible in the closed bill are not visible when looked at from one side.

Occurrences in India.—(1) Head and feet now in the British Museum; obtained in Nepal by Hodgson, 1829. (2) Head and feet in the Bombay Natural History Society's Museum, shot by General Osborn on the Beas River, Punjab, 6th January 1900. (3) A skin in the same Museum presented by Mr. J. Crerar and shot by him in Larkhana District, Sind, on the 31st January 1904. (4 & 5) Two heads in the Bombay Museum presented by Col. Magrath and

shot by Mr. M. Donlea out of a herd of seven, on the 10th December 1910, near Dera Momim, on the Kabul River.

Distribution.—The whole of Northern Europe and Africa extending to Japan and Greenland. Burturlin gives its most Northern breeding range as Verkhore-Kolymsk, 65° 4½′ N., South, it extends in Winter to Southern Europe, Asia Minor, Persia, India and China.

Cygnus bewicki.

Bewick's Swan.

Cygnus bewicki.—Yarrel, Trans. Linn. Sec. xvi, p. 453 (1830); Hume, Str. Feath. vii, pp. 107 & 464 (1878); Hume & Marsh. Game-B. iii, p. 51 (part) plate (1880); Salvadori, Cat. B. M. xxvii, p. 291 (1895); Stuart Baker, Jour. B. N. H. S. xi, p. 14 (1897); Blanford, *ibid*, p. 306; Sharpe, Hand.-L. 1. p. 207 (1899); Buturlin, Ibis 1907, p. 651; Stuart Baker: "Indian Ducks and their Allies" p. 12, 1908; *id*, J. B. H. N. S. xviii, p. 754—8 (1908); *id*, *ibid*, xxi, p. 273.

Cygnus minor.—Keyserling & Blasius, Werbelthiére, pp. 6, xxxii and 222 (1840); Stuart Baker, J. B. N. H. S. xi, pl. i. (1897).

Description.—Of the swans with the yellow lores, Bewick's Swan is the smallest, seldom having a wing exceeding 21″, indeed Buturlin gives the greatest measurement of any bird measured by him as 20″ (520 mm.). The bill is strikingly shorter than that of *cygnus*, being seldom, if ever, over 3·75″ (94·2 mm.) but is, on the other hand, comparatively much deeper at the base measuring up to 1·72″ (43·6 mm.), the diminution in depth, from forehead to tip, is also much more abrupt, so that the upper outline presents a concave appearance. The serrations on the upper mandible in the closed bill are visible over about two-thirds the total length of the bill. In colouration the yellow is restricted to a portion of the base above, and never touching the nostril and is nearly always well defined from the black in a clean, curved line enclosing the higher extremity of the hollow in which the nostril is placed and thence extending back along the margin of the upper bill to the gape. The feet also are much smaller, the tarsus generally being less than 3·80″ (96·5 mm.), whereas in *musicus* it is generally over 4·2″ (106·7 mm.) and Buturlin gives the smallest of his series of the latter bird as 4·4″ (115 mm.).

Occurrences in India.—(1) Skin now in Bombay Natural History Society's Museum obtained by Mr. B. L. McCulloch of the Indian Police at Jacobabad in Sind, on the 2nd December 1907. (2) A skin of a female in the same Museum shot by Major P. C. Elliot-Lockhart near Mardan, on the N.-W. Frontier, on the 30th December 1910.

Distribution.—Over Northern Europe and Asia as far East as the Lena Delta, extending in some numbers as far West as Great Britain. In winter it extends South into Central Europe and South Russia as far as the Caspian and in Asia as far South as Persia, Northen India and Central West China. The records of its appearance in South-East China and Japan probably generally refer to the next bird, *jankowskii*.

Cygnus jankowskii.

Alpheraky's Swan.

Cygnus bewicki jankowskii, Alpheraky—Priodai Okhata (Nature and Sport), Russia, September 10th, 1904.

Cygnus jankowskii, Buturlin, Ibis, 1907, p. 651.

Description.—Buturlin (*in loc cit*) writes: "It is altogether larger than *C. bewicki*, while the yellow of the bill is somewhat more developed, but the best diagnostic character is its much broader bill. Fully adult examples of *C. bewicki* have the maximum breadth of the bill 28—30·5mm., exceptionally reaching to 31mm., but then this specimen has the bill from the eye 122mm. long."

The breadth of the bill is a good character generally but, as a matter of fact, the type of *bewicki* in the British Museum has the bill at its broadest part no less than 32mm. wide and another bird obtained by Yarrel at the same time has it 31·7mm. As will be seen, however, from Gronvold's excellent plate the shape of the bill is different to that of *bewicki* although the distribution of colour is the same. The upper margin of the bill in *jankowskii* is almost as straight as it is in *Cygnus cygnus* and does not show a concave line as in *bewicki*, the bill is also much longer in proportion to the depth and the serrations in the closed bill show for three or four of their number. The yellow also appears to be considerably darker and more orange in tint than it is in either *cygnus* or *bewicki*. In the only specimens I have seen it is also noticeable that the black runs as a narrow line round the forehead.

Alpheraky treats this swan as a sub-species of *Bewick's Swan*, but I see no reason why we should not give it full rank as a species. Buturlin obtained a large series and in the Lena Delta the two birds were actually breeding in the same area, yet here they acquire not an intermediate form as we should expect, but are all individually referable to either Alpheraky's or Bewick's Swans. Nor does Buturlin say anything to show that he found individuals of the two forms pairing together.

Undoubtedly some large *bewicki* are as big as small *jankowskii*, but even these appear to be distinctly referable in other respects to one or the other form.

Occurrences in India.—(1) A skin in the Bombay Natural History Society's Museum shot by Mr. Hornsby, on the 2nd January

1911, at Tubi, Campbellpur. The orange tint in the bill of this bird was very distinct when first seen by me in August in 1911.

Distribution.—"Breeds in the tundras of Eastern Siberia from the Lena Delta eastward." "During migration it is met with as far West as Dzungaria" (Buturlin.) It extends South during winter into Central Asia and, as above, into India and China, whence I have seen a skin collected by LaTouche. Probably the majority of reported occurrences of *bewicki* in China and Japan should refer to this species. A swan seen by Major Harington near Maymyo, in the Shan States, *may* have been of this species.

Cygnus olor.

The Mute Swan.

Anas olor—Gmel. Syst. Nat. 1, pt. 2, p. 502 (1788); Latham, Ind. Orn. ii, p. 834 (1790).

Cygnus olor.—Vicill. Nouv. Dict. d'Hist Nat. ix, p. 37 (1817); *Scully, Stray Feath. iv, p. 197 (1876); Blanford, Stray Feath. vii, pp. 99, 100, 101 (1878), Hume, Stray Feath. vii, pp. 101, 106 (1878); *id*, Proc. As. Soc. Beng. (1878), p. 138; Hume and Marshall, Game B. Ind. iii, p. 41, plate (1880); Salvadori, Cat. Birds B. M. xxvii, p. 35 (1895); Stuart Baker, J. B. N. H. Soc. xi, p. 16, plate (1897); Sharpe, Handl-L. 1. p. 209 (1899), Cumming, J. B. N. H. Soc. xvi, p. 697.

Cygnus unwini.—Hume, Ibis 1871, p. 413; Blanford, Stray Feath. vii, p. 100 (1878); Hume, Stray Feath. vii, p. 104 (1878).

Cygnus sibilus. Hume, Stray Feath. vii, p. 105 (1878).

Cygnus falumi.—Homeyer, Hume, Stray Feath. vii, p. 105 (1878).

Cygnus sp. Blanford, Stray Feath. vii, p. 100 (1878); Hume, Stray Feath. vii, p. 104 (1878).

Description.—When adult this swan can always be distinguished at a glance by the knob at the base of the bill, but at all ages it can be determined by the black lores.

Occurrences in India.—(1) Skin in British Museum, shot by W. Mahomed Umar, January 1857, in the Shah Alum River, Punjab. (2) Two young birds shot by Captain Unwin on the Jubee Stream, North-West Provinces, January 1871. Skins in the British Museum. (3) Three birds, the skin of one of which is in the British Museum, shot by Mr. E. H. Watson in the Sewan District of Sind, on the 12th February 1878. The same year many more were seen and in five cases a pair were shot, but no skins preserved. In June of the same year out of a flock of these birds, one was shot by Major Waterfield and one by Mr. D. B. Sinclair, and on the 7th July the latter gentleman saw another swan in the Gulabad Jheel,

* "I am not certain that I have correctly identified the species. No specimen was preserved.—J. S."

near Peshawar. (4) In 1900 Mr. Jones of the Indo-European Telegraph Co. shot two swans out of a herd of nine on January 10th. (5) In the Karachi Museum there is the skin of a bird, which was captured by Mr. Cumming, platelayer, after it had injured itself against a telegraph wire. This was on the 13th January 1900 and the bird formed one of a flock of eight. (6) Two swans were captured in nets by natives on the 6th February 1900 at Sita Road station. (7) At Boston on the Baluchistan Frontier four swans were shot by a Mr. Matthews, platelayer, early in February 1900. (8) In the same year Mr. J. Crerar, I.C.S., shot one about the middle of March on the Manchur Lake, Sind. (9) At the end of March the same year ten swans were seen and repeatedly fired at by Mr. Vivien on the Laki Lake. (10) On the 27th April 1900 a swan was shot by Mr. Wragge, platelayer, at Metong, about 12 miles from the Indus. (11) In the same year Major-General Egerton saw a herd of swans at Kandian on the Indus. (12) In the end of March 1910 Capt. H. O'Brien obtained one at Nowshera. (13) Mr. P. Lord shot one on the R. Sohan, Punjab, on 26th January 1911. (14) In 1911, on 6th February, Mr. L. C. Glascock shot one near Lahore.

Distribution.—"Denmark and South Sweden, South Russia, valley of the Danube, Transylvania and Greece, and passing the Northern Shores of the Caspian to Turkestan and Mongolia, wanders in the Southern portions of the Caspian occasionally in the extreme North-West of India and in the Basin of the Mediterranean" (Salvadori).

BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA, BURMA AND CEYLON.

Report No. 16.

By R. C. Wroughton.

Collection ... ... No. 16.
Locality ... ... Dry Zone, Central Burma and Mt. Popa.
Date ... ... July-October 1913.
Collected by ... ... Mr. G. C. Shortridge.
Earlier Reports... ... No. 1, E. Khandesh, Vol. XXI, p. 392, 1912; No. 2, Berars, Vol. XXI, p. 820, 1912; No. 3, Cutch, Vol. XXI, p. 826, 1912; No. 4, Nimar, Vol. XXI, p. 944, 1912; No. 5, Dharwar, Vol. XXI, p. 1170, 1912; No. 6, Kanara, Vol. XXII, p. 29, 1913; No. 7, Central Provinces, Vol. XXII, p. 45, 1913; No. 8, Bellary, Vol. XXII, p. 58, 1913; No. 9, Mysore, Vol. XXII, p. 283, 1913; No. 10, Kathiawar, Vol. XXII, p. 464, 1913; No. 11, Coorg, Vol. XXII, p. 486, 1913; No. 12, Palanpur, Vol. XXII, p. 684, 1913; No. 13, South Ceylon, Vol. XXII, p. 700, 1913; No. 14, Shan States, Vol. XXII, p. 710, 1913; No. 15, Kumaon, Vol. XXII, p. 282, 1914.

This collection represents the Fauna of the Dry Zone of Upper Burma, and the local Fauna of Mt. Popa. This Dry Zone is represented roughly by the Districts of Shwebo, Lower Chindwin, Mandalay, Pakokku, Myingyan, Sagaing, Kyaukse, Meiktila, Minbu, Magwe and Yamethin. It covers about 35,000 square miles, and occupies the whole basin of the Irrawady, between the Arakan Yomas and Chin Hills on the West and the Shan Hills on the East, from about 20° to 23° North Latitude.

The whole of this area may be classed as 'plain country,' with a scanty rainfall of about 25 inches, except on its outer edges where the climatic conditions are modified by the surrounding hilly country. The thermometer ranges from 105° in May to 55° in December. With the exception of the neighbourhood and slopes of Mt. Popa, the jungle consists almost entirely of dry scrub growth, the only tree of any value being the *Acacia catechu*, yielding the 'cutch' of commerce. Mt. Popa is an isolated volcanic peak, rising abruptly from the surrounding plain, in the middle of the Dry Zone. It reaches a height of close on 5,000 feet and as was to be expected the climatic conditions are considerably modified on its wooded slopes.

The following notes on the camps visited are furnished by Mr. Shortridge:—

Mandalay City.—Population 183,816. The Head-quarters of the District and Division of the same name. Situated on the East bank of the Irrawady, about 21° 50′ North and 96° 6′ East. The

Capital of the old Kingdom of Burma between 1856 and 1885. The old City, now known as Fort Dufferin, forms part of the Cantonment. With the exception of Mandalay Hill, the country is flat. The trees round the City, which have been planted, consist of Tamarinds, Mangoes, Figs and other shade trees.

Mingun, a village containing many ruins, on the West bank of the Irrawady, about 11 miles above Mandalay, in the Sagaing District. Along the bank of the river is a narrow populated strip of flat country, thickly studded with Tamarinds, Mango and Fig Trees, Cocoanut Palms and Plantain Gardens. Behind this is a range of hills rising to above 1,000 feet covered with thick low scrub.

Kyouk Myoung, on the West bank of the Irrawady, in Shwebo District, about 45 miles above Mandalay. The rainfall is rather heavier here than round Mandalay and the typical scrub is higher and thicker. The banks rise slightly from the river, but there are no hills, the whole country being flat or undulating and largely under rice cultivation. A few Hog Deer and Thamin are said to occur in the neighbourhood. Blanford notes that this place was visited by Fea.

Ngapyinin, a small village, exactly opposite the last, on the East bank of the river. The country differs from that on the West bank in being more hilly and broken. The jungle also is much higher and contains patches of bamboos. Except along the bank of the river there is no cultivation. Tsaine and Porcupines were observed in the district.

Mount Popa.—An extinct volcano, 4,962 feet in height, rising abruptly out of the plain and surrounded by dry, open country for at least 50 miles in every direction. Situated in 20° 56′ North by 95 °16′ East, in Myingyan District, in the centre of one of the most arid parts of the Dry Zone. The mountain is more or less conical, its summit being covered with grass. The upper slopes and inside of the Crater clothed partly with temperate evergreen Forest, and partly with Gardens, which are replaced on the lower slopes by dry deciduous forest mixed with bamboos. On account of its height Mt. Popa catches a heavy rainfall, so that the Climate and Vegetation are quite distinct from those of the surrounding country. According to the Gazetteer (1908) barely 50 years have elapsed since Elephants, Rhinoceros, Sambhar and Tigers occurred in the Forests of Mount Popa, but they have now entirely disappeared. Serow have been shot more recently, but the local villagers state that none have been seen for some years. In the evergreen forests on the higher slopes the trees are covered with thick moss, ferns and orchids, while in places the ground is carpeted with bracken and masses of pink and white balsam, over which were seen hovering numbers of black and yellow *Ornithoptera*. The principal

crops grown on Popa are Indian corn, plantains, sweet potatoes, custard apples, guavas, rice and sesamum, the two last chiefly on Popamyo plateau, on which the village of the same name is situated at between 2,000 and 3,000 feet altitude, the descent to the plains from this point being steep and precipitous.

Pagan, an ancient ruined City, the Capital of the Burmese Empire, about the years 750-1280 A.D. Situated at 21° 10′ North by 94° 53′ East on the left bank of the Irrawady, towards the South-West of the Myingyan District. The most noticeable feature is the thousands of Temples and Pagodas, most of which are in ruins, and which afford shelter for countless numbers of Bats. It is situated in one of the driest and most barren parts of the dry belt. The chief vegetation is low prickly scrub cactus and milk bush, with a few Tamarinds and Acacias dotted here and there. The district is said to be more dry and arid than formerly, owing to its denudation of trees. The country round is almost flat, with the exception of the Taywindaing range of hills, which rise about 10 miles inland and stretch in a south-easterly direction, forming a short, narrow line of rocky peaks, some of which rise to a height of over 1,000 feet. The ground is very poor, the chief crops grown locally being early sesamum, ground-nuts, pulse and jowar.

The Collection contains 1,090 specimens, but of these, 32, contributed by local Members of the Society, are from the Shan States, or other areas beyond the scope of this Report, and I have dealt with them in an appendix. The remaining 1,059 specimens belong to 53 species in 38 Genera.

The most notable fact in connection with the Collection is the discovery of the two new species, *viz.*, *Millardia kathleenæ*, Thos., and *Leggadilla shortridgei*, Thos. So far as I am aware neither of these Genera have before been found East of Assam. Besides these there are more than 20 forms whose names appear for the first time in the records of the Survey.

Ratufa gigantea was described from Assam. The National Collection contains specimens from Siam, and even as far south as Hainan, and quite recently has received specimens from Myitkyina (Capt. A. W. Kemmis, 1908), Katha (Col. C. E. Nichol, 1911,) Madaya Forest, 55 miles N. of Mandalay (C. S. Barton, 1914), and finally it has been recorded by Miss Ryley in the Shan States Report (No. 14) as occurring there. On the other hand *Ratufa melanopepla* has been recorded from some of the islands of the Malay Archipelago, from the whole of the Malay Peninsula and from Tenasserim, and here we have it from Mt. Popa. The distribution of these two species throughout their habitats is thus sketched out and there is little doubt that our Upper Chindwin and Pegu Collections will support this view.

There is a somewhat similar problem in connection with *Lepus peguensis* and *Lepus siamensis*, but unfortunately there is a link missing. This Collection shows that *peguensis* occupies the Valley of the Irrawady up to at least 22°, and this is confirmed by some specimens in the Natural History Museum collected by Maj. H. Harington "N. of Mandalay." No hare is, I believe, known south of Rangoon. As mentioned further on, Major Harington collected, "near Bhamo," a series which is closely allied to, if not identical with *siamensis*. Unfortunately the Shan State Collection contained no hares. Will some local members help in this matter by sending some of the Northern and Southern Shan States hare or hares?

On the whole there does not appear to be so much difference between the Fauna of Popa and that of the surrounding country as might have been expected. The closest affinity of this mountain Fauna seems to be with that of the Shan States. The *Tupaia*, *Sciuropterus*, *Menetes* are all identical with those found in the Shan States, and each of them is a local variation of a southern Pegu form. We have nothing among the specimens from the plain country with which to compare them, which is natural enough in view of the absence of suitable forest except on Popa. It is true that *Sciurus ferrugineus* is essentially a Pegu species, but it is also found in the Shan States (see Appendix). The large majority of the Bats included in the Collection are from the plains, but this is due to the ruined Pagodas of Mingun and Pagan, and not to the effect of climatic conditions. It may however be noted that all the *Scotophilus kuhli* are from Popa, while all the *Scotophilus wroughtoni* are from the plains, they have however, in former collections, so often been received together from the same place that but little importance can be attached to their present separation, any more than to the curious monopoly enjoyed by Mandalay in *Rhinolophus fulvus* and by Ngapyinin in *Sciurus phayrei*.

Specimens received from members as follows:—

Sagaing District	...	Major F. C. Owens.
Magwe District	...	J. P. Cook.
Lower Chindwin	...	G. W. Dawson, I.C.S. and S. F. Hopwood, I.F.S.
Pyawbwe ...	...	Capt. F. E. W. Venning.
Pyinmana ...	...	C. B. Moggridge.
Pakokku ...	...	Major C. E. Bowen.
Mandalay ...	...	Capt. S. Pershouse.

are included in the main report, while the following:—

N. Shan States	...	J. P. Cook.
S. Shan States	...	Capt. F. E. W. Venning and J. P. Cook.
Myitkyina District...		Capt. F. E. W. Venning.
Maymyo ...	...	G. B. H. Fell, C.I.E., I.C.S. and J. P. Cook.

Chin Hills ...	...	S. F. Hopwood, I.F.S. and Capt. W. J. Massy.
Thayetmyo...	...	F. B. Leach, I.C.S.
Thaton ...	...	R. V. Littlewood.

are dealt with in the Appendix.

The detail in which the Survey is now being carried out is, I believe, already a strain on the finances available, and any more 'intense' collecting is quite out of the question; it is clear therefore, if the results of the Surveys are to be supplemented, and linked up, it can only be done by the exertions of local residents. I venture to offer the above-named gentlemen my best thanks, and to express a hope that they will continue to take an interest in the Mammal Fauna around them and to help forward the study of them.

Pithecus assamensis, Mc. Cl.

The Himalayan Monkey.

1839. *Macacus assamensis*, Mc.Clelland, P. Z. S., p. 148.
1840. *Macacus (Pithex) pelops*, Hodgson, J. A. S. B., IX., p. 1213.
1888. *Macacus assamensis*, Blanford, Mammalia, No. 4.

♀ 1. Mingun.
♀ 5. Mt. Popa.

"Plentiful on Mt. Popa. Occurring in the Dry zone on both sides of the Irrawady, but apparently rare away from jungle or hills. Though a typical Macaque in its habits, and occasionally to be found around village gardens and crops, this species does not seem to have become semi-tame in habits like *rhesus* and *sinicus* of India. The species seen by Anderson near Yenangyaung, on the Irrawady, about 30 miles to the south of Popa, was undoubtedly this species. Bare skin on face of all specimens obtained dusky, never red."—G.C.S.

Vernacular names—Myark (Burmese), Ling-kun-leng or Lingihkung (Shan).

Presbytis, sp.

There is a single specimen of Langur, collected by Mr. G. W. Dawson, included in this collection. The skull is missing. The animal was obtained in Yin, Lower Chindwin. Our collection from Chindwin may later enable a name to be put on this specimen at present I prefer to leave it unnamed.

Presbytis phayrei, Blyth.

Phayre's Leaf Monkey.

(Synonymy in No. 14.)

♂ 3, ♀ 3. Mt. Popa.

(The specimens and remarks under this species in Report No. 14 are referable to the next species.)

"Fairly plentiful on the higher slopes of Mt. Popa, which is, without doubt on account of the physical conditions of the country, the northern limit of the range of this species to the east of the Irrawady, further north and on the Shan Hills it is replaced by *P. barbei*, further south the water-shed of the Sitang River probably divides the two species. The Burmese Leaf Monkeys differ in many of their habits from the Indian Langurs, they

are less noisy and conspicuous and rarely frequent cultivated districts, being almost exclusively forest dwellers"—G.C.S.

Vernacular names—MYAUK-HGENYO or MYAUK-MYET-KWIN-BYU (Burmese).

* PRESBYTIS BARBEI, Blyth.

Barbes Leaf Monkey.

1847. *Presbytis barbei*, Blyth., J. A. S. B., XVI., p. 734.
1888. *Semnopithecus barbei*, Blanford, Mammalia, No. 22.

♂ 1, ♀ 1. Kyouk Myoung.

"Fairly plentiful around Ngapyinin, opposite Kyouk Myoung, probably wanderers from the Shan Plateau, which is not far from the river at this point. It will probably not be found on the Irrawady below Mandalay, where the country becomes too open, though how far south *barbei* extends in the Shan States still remains to be shown. Though superficially very like *phayrei*, the hair on the crown is not directed backwards but radiates from a point above the forehead. There is no crest. In life the triangular pale patch round the mouth is present in both species, but the actual white hairs are more conspicuous in *barbei*. The pale ring round the eye in *phayrei* is almost white, giving the appearance of a pair of spectacles, while in *barbei* this ring only extends over a semicircle on the inner side of the eye; the distinction is lost in dried specimens."—G.C.S.

Vernacular names—MYAUK-HGENYO or MYAUK-MYET-KWIN-BYU (Burmese). LING-KANG or LING-MUN (Shan.)

ROUSETTUS LESCHENAULTI, Desm.

The fulvous Fruit Bat.

(Synonymy in No. 11.)

♂ 1. Mingun.
♂ 11, ♀ 20. Pagan.

(*See* also Reports Nos. 11 and 15.)

"A large colony was found in an old Pagoda at Pagan, where they roosted in company with *Taphozous kachhensis*. This animal differs from *Cynopterus sphinx* in being a cave or temple dweller, while the latter is generally found in the heads of Palm trees, though occasionally found under the eaves of houses."—G.C.S.

Vernacular names—LINZWAI (Burmese also used for the Flying Fox.)

CYNOPTERUS SPHINX, Vahl.

The Southern short-nosed Fruit Bat.

(Synonymy in No. 6.)

♂ 1, ♀ 2. Mingun.
♀ 1. Mt. Popa.
♂ 3, ♀ 3. Pagan.

(*See* also Reports Nos. 6, 9, 11, 13, 14 and 15.)

"These Bats were observed in very large numbers around Mandalay, during the Mango season. It was found at Pagan, as usual, in the crowns of Toddy Palms and at Mingun both in Palms and under the eaves of Verandahs."—G.C.S.

Vernacular name—LINZWAI (Burmese).

* The specimens from the N. Shan States (Report No. 14) were in error referred to *phayrei* instead of *barbei*.

RHINOLOPHUS LEPIDUS, Blyth.

The little Indian Horse-Shoe Bat.

(Synonymy in No. 6.)

♂ 10, ♀ 31, in al. 12. Pagan.

(*See* also Reports Nos. 6, 7 and 15.)

"Some very large colonies of this Bat were found at Pagan roosting inside Pagodas and caves".—G.C.S.

Vernacular name—LINHNO or LINNO (Burmese for all insectivorous Bats).

HIPPOSIDEROS LARVATUS, Horsf.

Horsfield's leaf-nosed Bat.

(Synonymy in No. 14.)

♂ 6, ♀ 8. Mingun.
♂ 2, ♀ 2. Kayouk Myoung.
♂ 4. Mt. Popa.
♂ 8. Pagan.
1 (no skull) Yin, L. Chindwin. (Collected by G. W. Dawson, I.C.S.)

(*See* also Report No. 14.)

"Existing often in enormous numbers throughout the Dry Zone, where they roost in Pagodas and caves."—G.C.S.

HIPPOSIDEROS FULVUS, Gray.

The bi-coloured leaf-nosed Bat.

(Synonymy in No. 3.)

♂ 13, ♀ 11, in al. 8. Mandalay.
♂ 4, ♀ 3, in al. 2. Mingun.
♂ 1, ♀ 1. Mt. Popa.
♂ 2, ♀ 6, in al. 4. Pagan.

(*See* also all former Reports except Nos. 1, 2, 4, 11 and 15.)

"Very plentiful. Twice found resting in Porcupine burrows."—G.C.S.

MEGADERMA SPASMA TRIFOLIUM, Geoff.

The Malay Vampire Bat.

(Synonymy in No. 5.)

♂ 1, ♀ 3. Kyouk Myoung.

(*See* also Reports Nos. 5, 6 and 11.)

"Apparently rare. A small colony found roosting in an old Pagoda."—G.C.S.

PIPISTRELLUS MIMUS, Wrought.

The Southern Dwarf Pipistrelle.

(Synonymy in No. 1.)

♂ 2. Mandalay.
♀ 1. Mt. Popa.

(*See* also all former Reports except Nos. 4 and 14.)

PIPISTRELLUS, sp.

♂ 1. Kyouk Myoung.

Mr. Thomas, who has examined this specimen, informs me that it differs from the others, which I have classed as *mimus*, "by its unicuspid inner upper incisors and slightly larger brain case, but in so difficult a group I do not venture to describe it without examining further material."

SCOTOPHILUS KUHLI, Leach.

The Common Yellow Bat.

(Synonymy in No. 1.)

♂ 1, ♀ 4, 1. Mandalay.
♂ 2, ♀ 1. Kyouk Myoung.
♂ 4, ♀ 10. Mt. Popa.

(*See* also Reports Nos. 1, 3, 5, 6, 7, 9, 12, 14 and 15.)

"Very plentiful every where—roosting in Caves, Temples, and occasionally the hollow branches of trees."—G.C.S.

SCOTOPHILUS WROUGHTONI, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

♂ 8, ♀ 16. Mingun.
♂ 5, ♀ 3. Pagan.
♂ 1. Mandalay.
1 (no skull) Ngazun, Sagaing. (Collected by Maj. F. C. Owens.)

(*See* also Reports Nos. 1, 5, 6, 7, 9, 10, 11, 12 and 15.)

"Plentiful but not quite so widely distributed as *kuhli*. The colonies when found are very large in old Pagodas, but they are occasionally found in rather smaller numbers hiding in the crowns of Palm trees."—G.C.S.

MINIOPTERUS FULIGINOSUS, Hodgs.

Hodgson's long-winged Bat.

(Synonymy in No. 15.)

♂ 1. Mingun.

(*See* also Report No. 15.)

"A single specimen obtained inside a Pagoda at Mingun. I could not ascertain if this species was plentiful as *Miniopterus* is very difficult to identify on the wing."—G.C.S.

TAPHOZUS KACHHENSIS, Dobs.

The Cutch sheath-tailed Bat.

(Synonymy in No. 1.)

♂ 11, ♀ 14. Pagan.

(*See* also Reports Nos. 1, 3, 8, 9, 10 and 12.)

"Numerous colonies were found inside old Pagodas at Pagan. The gular sac is present in both sexes of this species, though more fully developed in the males, which latter, like those of *longimanus* and *saccolaemus*, have a circular gland below the sac."—G.C.S.

TAPHOZOUS LONGIMANUS, Hardw.

The long-armed sheath-tailed Bat.

(Synonymy in No. 7.)

♂ 1. Mandalay.
♂ 8, ♀ 16. Pagan.

(*See* also Reports Nos. 6, 7, 8, 9 and 12.)

"Very plentiful in Pagodas at Pagan."—G.C.S.

TAPHOZOUS MELANOPOGON, Temm.

The black-bearded sheath-tailed Bat.

(Synonymy in No. 1.)

♂ 22. Mingun.
♂ 14, ♀ 5. Pagan.

(*See* also Reports Nos. 1, 2, 3, 4, 6, 7, 8 and 10.)

"Very plentiful in Pagodas at Pagan and Mingun. Like other members of the Genus, appears early on the wing and flies high. The *Emballonurida* generally have a very offensive smell."—G.C.S.

TUPAIA BELANGERI SICCATUS, Thos.

The Burmese tree Shrew.

1888. *Tupaia ferruginea*, Blanford, Mammalia, No. 102 (*partim*).
1914. *Tupaia belangeri siccata*, Thomas, A. M. N. H., 8. xiii, p. 243.

♂ 5, ♀ 3. Mingun.
♀ 2. Ngapyinin.
♂ 1. Kyouk Nyoung.
♀ 2. Pyawbwe, Yamethin Dist. (Collected by Capt. F. E. W. Venning).
♂ 8, ♀ 13. Mt. Popa.
♂ 1. Pagan.

Dr. Lyon recently published a Monograph of the Tree-Shrews (Proc. U.S. Nat. Mus., Vol. 45, pp. 1—188, 1913). Still more recently Mr. Thomas took up the question of the relationship of *Tupaia belangeri* and *Tupaia chinensis*. Agreeing with Dr. Lyon, he came to the conclusion that *belangeri* and *chinensis* cannot be maintained as separate species, and the latter represents the Yunnan form of *belangeri*, which is itself a Tenasserim form. In the course of his examination, Mr. Thomas found that, while apparently distinct, the form from the Dry Zone of Upper Burma had no name and he accordingly named it "*siccatus*." The present fine series supports entirely the view taken by Mr. Thomas. The series in the Shan States collection, provisionally ranked as "*chinensis*", by Miss Ryley, belong to this species.

"Plentiful and apparently evenly distributed throughout the dry belt. Generally most numerous around villages where trees have been planted, when it may easily be mistaken for *Sciurus pygerythrus*. Although diurnal, Tree Shrews also move about a good deal in the evening and are often caught in traps set over night. In adults of both sexes there is a narrow well defined gland on the throat around which the hairs radiate. During life this gland has a slight smell of Civet, otherwise the animal has no perceptible odour."—G.C.S.

Vernacular name—SHIN-ZWI (Burmese).

CROCIDURA FULIGINOSA, Blyth.

Blyth's Shrew.

1856. *Sorex fuliginosus*, Blyth., J. A. S. B., XXIV, p. 362.
1888. *Crocidura fuliginosa*, Blanford, Mammalia, No. 126.

♂ 1. Mt. Popa.

This is almost certainly Blyth's *fuliginosus*, with the description of which it agrees. The type of *fuliginosus* was from Pegu. This is a most valuable acquisition and will be most useful when the group comes to be worked out.

PACHYURA (?).

1. Ngazum, Sagaing. (Collected by Maj. F. C. Owens.)

A single specimen without skull. It is impossible to deal with it, it may even be an immature individual of the Common Muskrat.

FELIS PARDUS, L.

The Panther.

(Synonymy in No. 5.)

♀ 2. (1 skull only). Mt. Popa.

(*See* also Reports Nos. 5, 6, 9, 11, 13 and 14.)

"Plentiful on Mt. Popa, as it apparently is throughout Burma".—G.C.S.

Vernacular name—THIT or KYA-THIT (Burmese), Hso-so? (Shan).

FELIS AFFINIS, Gray.

The Jungle Cat.

(Synonymy in No. 1.)

♂ 2. Mt. Popa.

(*See* also all former Reports except Nos. 2, 8, 9, 13 and 14.)

"Apparently not uncommon on Mt. Popa."—G.C.S.

Vernacular name—KYAUNG-BA.

FELIS BENGALENSIS, Kerr.

The Leopard Cat.

(Synonymy in No. 11.)

1 (no skull). Pakokuk (collected by Maj. Bowen).

(*See* also Reports Nos. 11, 14 and 15.)

Vernacular names—THIT-GYUK (Burmese), HEN-WAP (Shan).

FELIS TEMMINCKI.

The Golden Cat.

(Synonymy in No. 14.)

♀ 1, 1, (skulls only) Pyinmana. (Collected by C. B. Moggridge).

(*See* Report No. 14.)

"Not heard of at Mt. Popa. Skins of above specimens seen and identified."—G.C.S.

VIVERRA MEGASPILA, Bl.

1862. *Viverra megaspila*, Blyth. J. A. S. B., XXXI. p. 331.
1888. *Viverra megaspila*, Blanford. Mammalia, No. 47.

1 (no skull).—Allagappa, Sagaing. (Collected by Maj. F. C. Owens.)

Vernacular name—KYAUNG-MYENG-KWET (Burmese). HEN-HAWN or AMNGE (Shan).

In size and shape this animal is quite like *V. zibetha*, but it has a longer muzzle. It is at once distinguishable from *zibetha* however by its colour pattern, which is large dark spots on a light ground, especially on the posterior half of the body. The black rings are usually united by a black line along the upper side of the tail.

VIVERRICULA MALACCENSIS, Gmel.

The small Indian Civet.

(Synonymy in No. 3.)

1. Pakokku (Collected by Major Bowen).
♂ 1. Mt. Popa.
1. Allagappa, Sagaing. (Collected by Maj. F. C. Owens.)

(*See* also Reports Nos. 3, 5, 7, 10, 11, 12, 13 and 15.)

Vernacular name—KYAUNG-MYIN or KYAUNG-MYENG.

PARADOXURUS HERMAPHRODITUS, Pall.

The Malayan Palm Civet.

1778. *Viverra hermaphrodita*, Pallas, Schr. Sang, III, p. 246.
1822. *Viverra musanga*, Raffles, Trans. Linn. Soc. XIII, p. 252.
1888. *Paradoxurus hermaphroditus*, Blanford, Mammalia, No. 52.

♂ 5, ♀2. Mt. Popa.
♂ 3, ♀ 5. Mingun.
♀ 4. L. Chindwin. (Collected by G. W. Dawson, I.C.S.)
2 (skulls only) Sagaing. (Collected by Maj. F. C. Owens.)

This species differs from '*niger*,' the common palm civet of India, in having a quite distinct marking of stripes on the back. Schwarz some time ago described (A. M. N. H., VI, p. 230, 1910) a species "*vicinus*" from Assam much resembling the present form but with the ground colour "golden yellow." Some of the younger specimens in this series show a yellowish tinge but nothing approaching golden yellow.

"Apparently plentiful throughout the Dry Zone, identical with *niger* in its habits."—G. C. S.

Vernacular name—KYAUNG-WUM-PAIK (Burmese).

CANIS INDICUS, Hodgs.

The Jackal.

(Synonymy in No. 1.)

♀ 2. Mt. Popa.
1. Magwe. (Collected by J. P. Cook.)

(*See* also all former Reports except Nos. 2, 8 and 13.)

"Fairly plentiful and apparently widely distributed in Burma, although not so frequently heard as in India. Well known round Mt. Popa, Mandalay, Mingun and other parts of the Dry Zone, also ascending the Shan Plateau to around Maymyo, where they used to be hunted, and extending thence, though not in large numbers, as far East as the Salween."—G. C. S.

Vernacular names—TJOUNG-KKWE or KHWE-A (Burmese).

CUON RUTILANS, Muell.

The Malay Wild Dog.

1839. *Canis rutilans*, S. Mueller, Verhandl. Zool., p. 27.
1888. *Cyon rutilans*, Blanford, Mammalia, No. 71.

♀ 1. Mt. Popa.

"This specimen, which had only 10 mammæ, was run down and killed by a village dog, a thing most unlikely to occur with its larger Indian congener, although adult, it only weighed 19 lbs. This species hunts in packs like *dukhunensis*, but, owing to its small size, is much less destructive to large game, its ordinary prey is probably Barking Deer, Goats, Hares or other comparatively small animals".—G.C.S.

Vernacular names—TAW-KHWE (Burmese), MANAI (Shan).

HELICTIS PERSONATA, Is. Geoff.

The Burmese Ferret Badger.

1834. *Melogale personata*, Geoffry, Bel. Voy. Zool., p. 137.
1888. *Helictis personata*, Blanford, Mammalia, No. 88 (*partim*).

♂ 1, ♀ 3. Mt. Popa.
Skull 1. Legyi, Sagaing. (Collected by Major F. C. Owens.)

The 'Ferret Badger' is a very expressive name for this animal. It is coloured uniformly brown but for the characteristic white markings on the face, and a line from the forehead to the middle of the back. The terminal portion of the tail is also white.

Blanford recognises only two species, *viz.*, *orientalis*, described from Java, and the present species, which Geoffry described from "the neighbourhood of Rangoon, in Pegu." Bonhote however who studied the genus in 1903 came to the conclusion (A. M. N. H., XII., p. 593) that there are two well marked groups in the Genus characterised by the size of the teeth, *viz.*, the large toothed western forms and the small toothed forms from Borneo, Formosa and China. In the first group he puts four species, *viz.*, *nipalensis* from India, *personata* from Pegu, *orientalis* from Java and *pierrei* from Cochin China.

"Apparently widely distributed in the dry belt but nowhere plentiful. A ferret-badger is known to occur around Maymyo, one having been killed there by hounds. Two of the specimens, although nearly full grown, were found in the same burrow with an old female which was still suckling them. Three individuals which were kept alive for a short time were not aggressively savage, and would allow themselves to be handled, though when irritated they would snap at and hang on to anything like a true badger. Although in habits this animal resembles the skunks it has no offensive smell of its own and apparently mimics no other animal here as its congener *orientalis* certainly does in Java."—G.C.S.

Vernacular name—KYAUNG-U-KYIN or KYAUNG-U-GYI (Burmese).

LUTRA MACRODUS, Gray.

The Smooth Indian Otter.

(Synonymy in No. 7.)

1 (no skull) Sagaing. (Collected by Major F. C. Owens.)

(*See* also Report No. 7.)

"Otters are said to be plentiful on the Upper Irrawady and Chindwin."—G.C.S.

Vernacular names—HPYAN (Burmese), MOHN (Shan).

Sciuropterus phayrei probus, Thos.

Blyth's Flying Squirrel.

1891. *Sciuropterus sagitta*, Blanford, Mammalia, No. 235 (*partim*).
1914. *Sciuropterus phayrei probus*, Thomas, Journ., B.N.H.S. Vol. XXIII. p. 27.

♂ 20, ♀ 14. Mt. Popa.

"Very plentiful on Mt. Popa, at an altitude of about 3,000 feet. Being nocturnal and entirely arboreal and too small to be readily seen even on moonlight nights, and having no loud distinctive call, it is often very difficult to know when *Sciuropterus* occurs in a district. The present specimens were all caught by day inside hollow trees at some distance from the ground, not in dense forest but in partly cleared jungle around cultivation. They probably feed in such places, partly at least, on custard apples, guavas and other cultivated fruits."—G.C.S.

Vernacular name—Shin-pyan (Burmese).

Belomys, sp.

♂ 1. Mt. Popa.
1. Yin, Lower Chindwin. (Collected by G. W. Dawson, I.C.S.)

"One specimen was caught on Mt. Popa in the same locality as *Sc. ph. probus*; it was probably a straggler from the heavy forest higher up the mountain."—G.C.S.

Ratufa melanopepla, Mill.

The Tenasserim Giant Squirrel.

1900. *Ratufa melanopepla*, Miller, Proc. Wash. Ac. Sc. II., p. 71.
1891. *Sciurus bicolor*, Blanford, Mammalia, No. 240 (*partim*).

♂ 4, ♀ 5. Mt. Popa.
1 9 (no skull) Yin, L. Chindwin. (Collected by G. W. Dawson, I.C.S.)

This squirrel is very like *gigantea*, *i.e.*, entirely black above and entirely buffy yellow below, but it is easily distinguishable at sight by the fact that *gigantea* has the upper side of the forearm black, while in *melanopepla* the yellow underside extends over the upper for a certain portion of the forearm, between the wrist and the elbow. The present series is very regular and averages considerably larger than typical *melanopepla* from Trang (just beyond the Tenasserim border). In the National Collection there are however specimens from other parts of Tenasserim which are nearly "or quite" as large as these, so it will be safer to class these as *melanopepla* until we have representatives from Pegu, &c. It is a surprise to find this species here where one would have rather expected *gigantea*.

"Local and not very plentiful on Mt. Popa, only occurring in the heavy evergreen forest near the top of the mountain."—G.C.S.

Vernacular names—Shin-ngapaw-ani or Shin-nigyi (Burmese), Mamai (Shan).

Sciurus ferrugineus, F. Cuv.

The Burmese bay Squirrel.

1829. *Sciurus ferrugineus*, F. Cuvier, Mamm. pl. CCXXXVIII.
1830. *Sciurus keraudrein*, Lesson, Cent. Zool. pl. 1.
1891. *Sciurus ferrugineus*, Blanford, Mammalia, No. 242.

♂ 5, ♀ 6, Mt. Popa.

A squirrel a little more than eight inches long with a tail slightly longer. The whole animal is bay in colour except the feet which are black and the

tail tip which is white. These last two characters serve to distinguish it at once from the allied Siam form, *cinnamomeus*, Temminck.

This is one of a group of squirrels which varies greatly in their colouring, ranging from jet black to pure white. In a paper on the group published in 1908 (A. M. N. H., II., p. 393) I pointed out the difference (noted above) between it and *cinnamomeus* of Siam. The present series quite confirm the result I then arrived at.

"On Mt. Popa this species only occurred in the thick jungle on the higher slopes of the Mountain. Seen from a distance in a tree it appears black, the white tail tip showing up conspicuously."—G. C. S.

Vernacular names—SHIN-NGAPAW or SHIN-NI-GALE (Burma).

SCIURUS PYGERYTHRUS JANETTA, Thos.

The Irrawaddy Squirrel.

1832. *Sciurus pygerythrus*, Geoffry, Mag. Zool, Cl. 1.
1891. *Sciurus pygerythrus*, Blanford, Mammalia, No. 248 (*partim*).
1914. *Sciurus pygerythrus janetta*, Thomas, Journ. B.N.H.S., Vol. XXIII, p. 203.
♂ 5, ♀ 4. Mandalay.
♂ 13, ♀ 11. Mingun.
♂ 3, ♀ 5. Kyouk Nyoung.
♂ 1, ♀ 4. Pyawbwe.
♂ 6, ♀ 5. Mt. Popa.
♂ 1. Pagan.
2. Yin, S. Chindwin. (Collected by G. W. Dawson, I.C.S.)

SCIURUS PHAYREI BLANFORDI, Blyth.

Phayre's Squirrel.

1855. *Sciurus blanfordi*, Blyth, J. A. S. B., XXXI., p. 333.
1891. *Sciurus pygerythrus*, Blanford, Mammalia, No. 248 (*partim*).
♂ 10, ♀ 5. Ngapyinin.

Mr. Thomas has kindly examined this series as well as those in the Shan States Collection and the following are his conclusions.

"It would appear from this series (1) that the Upper Burma representatives of *S. phayrei* are distinguished from the typical form by their greyer and less buffy general colour, and (2) that the prominence of the dark lateral bands on the belly is influenced by season, the bands being strong in examples in fresh pelage and nearly or quite disappearing as the fur becomes worn.

Although the seasonal series is not complete round the year, there seems a strong probability that the types of *S. blanfordi*, obtained at Ava in October 1861, without any trace of stripes represent a seasonal phase of this species and I therefore use that name for them."

Will some member who has access to Ava work out this conundrum?

MENETES BERDMOREI DECORATUS, Thos.

Berdmore's Squirrel.

1891. *Sciurus berdmorei*, Blanford, Mammalia, No. 258 (*partim*).
1914. *Menetes berdmorei decoratus*, Thomas, Journ. B. N. H. S., XXIII, p. 23. ♂ 15, ♀ 15. Mt. Popa.

A small squirrel, rather larger than the common palm squirrel, with a sharply pointed head. There are 5 distinct black stripes on the back. Between and outside the outer pair of these on each side is a white stripe.

"Occurring on Mt. Popa among rocks and stones, that are surrounded by thick scrub, and often close to cultivation, up to 4,000 feet. Very shy,

running into holes and crevices at the slightest sound or movement. It is essentially a ground squirrel, seldom, if ever, ascending trees, though by no means confining itself to open country."—G. C. S.

Vernacular name—SHIN-BAYGAYA (Mt. Popa villagers).

VANDELEURIA DUMETICOLA, Hodgs.

Hodgson's Tree Mouse.

1845. *Mus* (*Vandeleuria*) *dumeticola*, Hodgson, A. M. N. H., XV., p. 268.
1891. *Vandeleuria oleracea*, Blanford, Mammalia, No. 270 (*partim*).

♂ 1. Mt. Popa.

"Probably more plentiful than it appears to be. It is nocturnal and arboreal, and is rarely trapped."—G. C. S.

Vernacular name—NGAPYAW-CHWET. (Mt. Popa.)

EPIMYS RUFESCENS, Gray.

The Common Indian Rat.

Variety with white underparts:—

♂ 5, ♀ 2. Pagan.
♂ 12, ♀ 9. Mt. Popa.
♀ 2. Ngapyinin.
♂ 1, ♀ 1. Kyouk Nyoung.
♂ 6, ♀ 6. Mingun.

(*See* also Reports Nos. 5, 6, 7, 9, 10, 11, 13, 14 and 15.)

The dark bellied form, which unfortunately at the beginning of these reports I labelled as '*rufescens*,' is here apparently entirely absent, as is noted by Mr. Shortridge in sending in his Collection. True *rattus*, *i.e.*, the English 'Black Rat,' has practically deserted Britain and is now the 'Sailor Rat,' and with the improvement of communications has spread all over the world. As we go East we seem to be getting into an area where the white bellied form is indigenous, and *rattus* a mere tourist. To me the evidence seems to be collecting that the original form of the species *rattus* was a white bellied one, and that its earliest home was in Malaya.

Vernacular names—CHWET, CHWET-WUM-BYU (Popa).

EPIMYS CONCOLOR, Blyth.

The little Burmese Rat.

1859. *Mus concolor*, Blyth, J. A. S. B., XXVIII., p. 295.
1891. *Mus concolor*, Blanford, Mammalia, No. 273.

♀ 1. Mingun.
♂ 1. Kyouk Nyoung.
♂ 23, ♀ 27, 1. Mt. Popa.
♂ 3. Pagan.

A small rat with the colouring of the common European house mouse. Its mammary formula of 2 pectoral + 2 inguinal on each side, "making 8 in all" is most characteristic.

Blanford records it from Moulmein, but not North of 20°.

"Probably distributed throughout the Dry Zone. Very plentiful in Popamyo Village, about half way up the Mountain, where it was very much more plentiful than *rufescens*, although that species occurred in normal numbers. It seems to be especially a house rat, seldom being trapped far from habitations. Not so carnivorous as *rufescens*. At Popamyo no animal matter seemed to be touched by them, though they were very

destructive to everything else. Very active, living largely in the roofs of houses. Said to be subject to bubonic plague equally with *rufescens*."—G. C. S.

Vernacular name—CHWET-MWE (Popa).

LEGGADILLA SHORTRIDGEI, Thos.

Burmese Spiny Mouse.

1914. *Leggadilla shortridgei*, Thomas, Journ., B.N.H.S. XXIII, p. 30.
♂ 4. Mingun.
♂ 13, ♀ 18. Mt. Popa.
♂ 2. Pagan.

"Very plentiful on Mt. Popa among rocks and around cultivation. Trapped at Mingun in Prickly Pear thickets."—G. C. S.

MUS MANEI, Kel.

The Common Indian House Mouse.

(Synonymy in No. 5).

♀ 1. Pagan.

(*See* also Reports Nos. 5, 6, 8, 9, 10, 11, 12, 13 and 14).

There is only a single specimen in this collection, so for convenience I place it under the name hitherto used for all but the specimens from Kumaon. The present specimen however differs somewhat from true *manei* in colouring, and may very well be an imported *musculus*.

"Appears to be much more local or scarce than it was on the Shan Plateau, possibly it is crowded out by *Epimys concolor*, where that species occurs."—G. C. S.

MUS NITIDULUS, Blyth.

Berdmore's Mouse.

1859. *Mus nitidulus*, Blyth., J.A.S.B., XXVIII, p. 294.
1891. *Mus nitidulus*, Blanford, Mammalia, No. 285.
♂ 1. Pagan.
♂ 9, ♀ 5. Mt. Popa.
♂ 1. Mandalay.

"Fairly plentiful on Mt. Popa in rocky country and around cultivation although out numbered by *Leggadilla* and *Mus booduga*."—G. C. S.

MUS BOODUGA, Gray.

The Southern Field Mouse.

(Synonymy in No. 1.)

♂ 29, ♀ 29. Mt. Popa.
1 (flat skin) Ngazun, Sagaing. (Collected by Maj. F. C. Owens).

(*See* also all former Reports except Nos. 3 and 14.)

These seem to average a shade larger in body measurement than true *booduga* from S. India, but the hind foot measurement does not show a corresponding increase.

"Swarming on Mt. Popa, especially in the cultivated lands round Popamyo. Probably widely distributed throughout the dry belt but like many of the small rodents abnormally plentiful on Mt. Popa."—G. C. S.

Vernacular name—CHWET-GALE (Popa).

GUNOMYS sp.

Thanks to specimens from Tenasserim (received later than these) I am in a position to say that these are not *G. varius*. Thos. So far as I can judge, neither are they *bengalensis*. As our knowledge of that species however is based on very imperfect material and as undoubted specimens may be expected in the Bengal Orissa Collection, I prefer, for the moment, not to give a specific name to this series. Both in skull and body proportions these are markedly larger than any *bengalensis* that I have ever seen.

♂ 2. Mingun.
♂ 8, ♀ 10, juv. 2. Mt. Popa.
♀ 1. Pagan.

"Living in burrows close to houses, &c., like other Indian Bandicoots. Plentiful in Popamyo Village and possibly in most towns and villages throughout the Dry Zone. At Mingun an individual was trapped inside a hollow tree about 8 feet from the ground."—G. C. S.

Vernacular names—TAW-CHWET (Popa), MYE-CHWET (Pagan).

MILLARDIA KATHLEENÆ, Thos.

The Burmese soft furred Field Rat.

1914. *Millardia Kathleenæ*, Thomas, Journ., B.N.H.S. XXIII, p. 29.

♂ 8, ♀ 6. Mt. Popa.
♂ 21, ♀ 16. Pagan.

"Plentiful at Pagan, especially in hedges around cultivation, also occurring around Popamyo Village where it was much less numerous—nocturnal." —G. C. S.

Vernacular name—LE-CHWET (Popa).

RHIZOMYS CASTANEUS, Blyth.

The bay Bamboo Rat.

(Synonymy in No. 14.)

♀ 1. Mingun.
♂ 15, ♀ 14. Mt. Popa.
1 (flat skin) Ngazun, Sagaing. (Collected by Maj. F. C. Owens).

(*See* also Report No. 14.)

"Occurring round every camp visited, both in dry and damp, open and forest localities. Particularly numerous on Mt. Popa, where its mounds were observed almost at the top of the mountain. *Rhizomys* evidently breeds before coming to its full size. The very large specimens were not at all plentiful, yet the more plentiful medium sized ones were evidently breeding and to all appearances adult. I doubt if these rats often come above ground except for mating or migrating purposes. The mounds on Mt. Popa were much larger than those made by the small species on the Shan Plateau."

Vernacular name—PWE (Burmese).

ACANTHION BRACHYURUM, L.

The Malay Porcupine.

1758. *Hystrix brachyura*, Linnæus. Syst: Nat: 10th Ed. p. 57.

♂ 2, ♀ 1. Mt. Popa; 2. Allappa, Sagaing (collected by Maj. F. C. Owens.)

I had identified these as *H. bengalensis*, Blyth. They were neither *leucura* nor *hodgsoni*, it seemed to me therefore that they must be *bengalensis*, which I had never seen but with the description of which they agree

quite fairly. On going more fully into the matter (on receipt of specimens from Tenasserim) it became evident that the proper name for them was undoubtedly as above. It seems to me probable that when a specimen of true *bengalensis* becomes available it will prove to be an *Acanthion*.

"Plentiful on Mt. Popa. Porcupines are frequently gregarious as shown by collections of earths with many entrances at Popa and Ngapyinium. Weight of a large female 30 lbs."—G. C. S.

Vernacular name—PHYU (Burmese).

LEPUS PEGUENSIS, Blyth.

The Pegu Hare.

1855. *Lepus peguensis.* Blyth, J. A. S. B. XXIV, p. 471.
1891. *Lepus peguensis.* Blanford, Mammalia, No. 322.

♂ 1. Mingun.
♂ 4, ♀ 15. Mt. Popa.
1. Ngazun, Sagaing. (Collected by Maj. F. C. Owens).
2. Lower Chindwin. (Collected by G. W. Dawson, I. C. S.).

This is a very regular series and agrees closely with Blyth's description. From the Bengal Hare (*ruficaudatus*) it is at once distinguishable by its black tail and white feet. Its near neighbour to the East is *siamensis* in which the feet are not white. There is in the National Collection a small series of a Hare, taken by Major Harington beyond Bhamo, which is certainly not this species. It is to be regretted that the Survey failed to obtain the Hare of the Shan Plateau.

"Very plentiful in cultivated ground on the slopes of Mount Popa and apparently widely distributed throughout the dry zone, but not always in large numbers. Occurring to at least as far North as Mandalay and Shwebo. A hare occurs on the Shan Plateau, fairly plentiful between Maymyo and Lashio and probably extends to the Salween."—G. C. S.

Vernacular name—YON (Burmese).

MUNTIACUS VAGINALIS, Bodd.

The Barking Deer.

(Synonymy in No. 2).

♂ 1, ♀ 1. Mingun.
♀ 2. Ngapyinin.
♂ 1, ♀ 2. Mt. Popa.

(*See* also Reports Nos. 2, 5, 7, 11, 14 and 15).

"Plentiful everywhere where there is sufficient cover. Barking Deer go about singly or in pairs and appear never to be gregarious, though there is no doubt that females are more numerous than males. In contrast with their habits in S. India, where in scrub jungle they are replaced by the Four horned Antelope, in Burma the Barking Deer is abundant everywhere, both on the hills and in the plains, in tree Forest and among low open scrub."—G. C. S.

Vernacular name—GYI (Burmese).

(?) SUS CRISTATUS, Wagn.

The Indian Wild Boar.

1 juv. (Skull only) Sagaing. (Collected by Maj. F. C. Owens).

Vernacular name—TAW-WET (Burmese) MU, (Shan).

MANIS AURITA, Hodgs.

The Eastern Pangolin.

1836. *Manis aurita*, Hodgson, J. A. S. B., V., p. 234.
1891. *Manis aurita*, Blanford, Mammalia, No. 400 (*partim*).
♂ 2. Mt. Popa.

In dealing with *Manis crassicaudata* in Report No. 3, I pointed out that the names *pentadactyla* and *brachyura* belonged to the Formosan Pangolin. It is possible that that form is identical with the Nepal-Sikkhim one *aurita*, which apparently extends unchanged into, at any rate Upper Burma. These specimens are certainly *aurita* and I adopt that name for them leaving the question as to their identity with the Chinese Pangolin to be settled later.

"Said to be uncommon on Popa, but probably occurring in suitable localities throughout the dry belt. They are nocturnal, but, when migrating from one district to another, it is not uncommon for Pangolins to travel by day. Skins are occasionally brought into Mandalay Bazaar for sale as medicine to the Burmans and Chinese."—G. C. S.

Vernacular names—THIN-GWE-GYAT or THENG-U-JAH (Burmese), LIN (Shan).

APPENDIX.

1. *Hipposideros armiger*, Hodgs. The great Himalayan Leaf-nosed Bat.
♂ 2. Gokteik, N. Shan States. Collected by J. P. Cook.

2. *Pipistrellus mimus*, Wrought.—The Southern Dwarf Pipistrelle.
1.—Maymyo. Collected by J. P. Cook.

3. *Scotophilus kuhli*, Leach.—The Common Yellow Bat.
♂ 1, ♀ 1. Hsipaw, N. Shan States. Collected by J. P. Cook.

4. *Pachyura hodgsoni*, Blyth.—The Himalayan Pigmy Shrew.
1. Hsipaw, N. Shan States. Collected by J. P. Cook.

5. *Petaurista lylei venningi*, Thos.—Venning's Flying Squirrel.
1891. *Pteromysy gunnanensis*, Blanford. Mammalia, No. 230 (*partim*).
1914. *Petaurista lylei venningi*, Thomas., Journ. B.N.H.S. Vol. XXIII, p. 26.
♂ 1. Kalaw, S. Shan States. Collected by Capt. F. E. W. Venning.

6. *Sciuropterus spadiceus*, Blyth.—The Pigmy Flying Squirrel.
1847. *Sciuropterus spadiceus*, Blyth, J. A. S. B, XVI, p. 867.
1891. *Sciuropterus spadiceus*, Blanford. Mammalia, No. 236.
♂ 1. Maymyo. Collected by G. B. H. Fell, C.I.E., I.C.S.

7. *Sciurus ferrugineus*, F. Cuv.—The Burmese Bay Squirrel.
♂ 1. Lawksawk, S. Shan States.
♀ 1. Gokteik, N. Shan States. Collected by J. P. Cook.

8. *Sciurus atrodorsalis shani*, Ryley.—The Shan Squirrel.
♂ 1. Maymyo.
1. Hsipaw, N. Shan States. Collected by J. P. Cook.
♂ 2, ♀ 1. Kalaw, S. Shan States. Collected by Capt. Venning.

9. *Sciurus phayrei blanfordi*, Blyth.—Blanford's Squirrel.
♂ 1, ♀ 1. Hsipaw, N. Shan States. Collected by J. P. Cook.

10. *Dremomys rufigenis adamsoni,* Thos.—Adamson's Squirrel.

1891. *Sciurus rufigenis,* Blanford. Mammalia, No. 244 (*partim*).
1914. *Dremomys rufigenis adamsoni,* Thomas., Journ. B. N. H. S., Vol. XXIII, p. 25.

♀ 1. Kalaw, S. Shan States. Collected by Capt. Venning.
♀ 1, 1. Maymyo. Collected by J. P. Cook.

A small squirrel, about 7 inches long, with a tail a couple of inches less. Grizzled black and yellow, with markedly red cheeks, the under parts white, except the midrib of the tail, which is red, like the cheeks. The chin is much whiter than in true *rufigenis* and the hairs of the inner sides of the thighs are white to their bases instead of being partially slatey as in the Southern form. The specimens ranked as *rufigenis* by Miss Ryley, in the Shan States Report (No. 14) belong also to this subspecies.

11. *Epimys rufescens* var.—The Common Indian Rat.

♀ 1. Gokteik, N. Shan States. Collected by J. P. Cook.

12. *Bandicota sp.*

♂ 1. Thaton, Tenasserim. Collected by R. Y. Littledale.

13. *Muntiacus vaginalis,* Bodd.—The Barking Deer.

1 juv. Hsipaw, N. Shan States. Collected by J. P. Cook.

The above specimens, though included in this collection, belong to the Fauna of the Shan States, dealt with by Miss Ryley in Report No. 14. Out of these 13 names no less than 7 do not appear in that Report. Of these latter there are two (Nos. 9 and 10 above) which are names modified as the result of further examination and they apply equally to the specimens mentioned in Report No. 14. The remaining 5 are additions to our list of the Shan Plateau Fauna—I believe it has always been the hope of the organisers of the Indian Mammal Survey (it certainly has been mine) that besides its direct results, it would stimulate the interest of Members in the Mammal Fauna of their Districts, and thus result in its being supplemented by their exertions. The above List, I venture to think, illustrates how much remains to be done, and how much can be effected by local private effort, after the Survey has passed on from any given District.

The following specimens, also included in the present Collection, belong to areas, whose Fauna has not yet been collected by the Survey.

1. *Felis tigris,* L. The Tiger.

1. Mogoung, Myitkyina Dist. Collected by Capt. F. E. Venning.

2. *Felis pardus,* L. The Panther.

1. Kamaing, Myitkyina Dist. Collected by Capt. F. E. Venning.

3. *Felis affinis,* Gray. The Jungle Cat.

1 (no skull). Thayetmyo. Collected by F. B. Leach, I.C.S.

4. *Felis bengalensis.* Kerr. The Leopard Cat.

2. (no skulls) Thayetmyo. Collected by F. B. Leach, I.C.S.

Mr. Leach's two skins represent two types of colouring, one is normal *bengalensis* (?) the other, with confluent spots and streaks is Hodgson's *pardochrous.* Can Mr. Leach or any other Member throw any light on the question whether these are mere individual variations, or represent distinct species (?) the above two specimens were taken at the same place on the same day.

5. *Aonyx cinerea*, Illig. The Clawless Otter.

♂ 1. Upper Chindwin. Collected by S. F. Hopwood, I.F.S.

6. *Sciurus ferrugineus*, F. Cuv.—The Burmese Bay Squirrel.

1. Pegu Yomas. Collected by J. P. Cook.

7. *Epimys bowersi*, And.—Anderson's Rat.

1878. *Epimys bowersi*, And. An. Zool. Res., p. 304.
1891. *Epimys bowersi*, Blanford, Mammalia, No. 276.

2. Kindat, Chin Hills. Collected by S. F. Hopwood, I.F.S.

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

(INCLUDING THOSE MET WITH IN THE HILL STATIONS OF THE BOMBAY PRESIDENCY).

BY

T. R. Bell, I.F.S.

(*Continued from page* 103 *of Volume XXIII.*)

Part XVII.

(*With Plate G.*)

Note on the Pieridæ.

In regard to the coloured pictures of the butterflies belonging to the family Pieridæ in plates I, J, K, and L, there is little to be said. They are, generally, very good indeed. The following might be noted :—

Leptosia xiyphia.—Pl. I, figure 58. Is very good, except that the white is not pure enough on the upperside, the brown has too much of red in it.

Delias eucharis.—Pl. I, figures 59, male ; 59*a*, female. It is the same with this again : the brown has too much red everywhere and the yellow of the underside is not clear enough.

Anaphæis mesentina.—Pl. I, figures 60, male ; 60*a*, female. The male is very good except that the brown is not black enough ; the yellow of the underside of the hind wing in the female is too red-soiled.

Huphina phryne.—Pl. I, figures 61, male ; 61*a*, female. The male is too yellow on the upperside ; it should be pure white. The female is better but the anal margin of the upperside of the hind wing is too yellow ; the underside of hind wing is too soiled, the yellow is not clear enough.

Ixias pyrene.—Pl. J, figures 65, male ; 65*a*, female. In the female figure the underside is too red in tone, the markings are browner ; the upperside is, perhaps, also, not clear enough, the base of the costa of fore wing is too red.

Ixias marianne.—Pl. I, figure 62, male ; Pl. J, figure 65*b*, female. The male is very good. In the female the broad border of the hind wing on the upperside is not black enough ; the base of fore wing on the upperside is not clear enough grey. There has been a mistake made here evidently, for the artist mistook figure 65*b* for a form of the female of *I. pyrene.*

Catopsilia.—Pl. L. Here the yellows and whites of the uppersides are good, being pure and clear ; however the yellows of the undersides of figures 72*a*, *b* and 73*a* are again too red.

Terias.—Pl. K, figure 69, *Terias læta*, is too red altogether both above and below ; the same might be said about 70*a*, but it is the usual fault of the process.

Pareronia hippia.—Pl. I, figures 63, male ; 63*a*, female. Here the male upperside is not clear enough blue, the veins are not black enough ; the female underside is too red.

The figures of *Colotis*, Pl. J, figures 6*u*, 67*a* and 68, as well as those of *Hebomoia glaucippe*, figures 66, male, 66*a*, female on the same plate are very perfect.

In the description of *Colotis eucharis* should be added that the male upperside fore wing has the veins in the immediate vicinity of the orange apical patch sometimes touched with black so as to form a more or less continuous inner black edging ; that the orange patch at apex of fore wing in the female is sometimes wanting, its place being taken by the white ground-colour. In the female the inner black bordering to this patch is always

curved which distinguishes it at once from the female of *C. etrida*, with which it might easily be confounded, this border being always straight in this latter species; also the preapical black spot (often a short bar) on upperside of hind wing is much more oblique than in *etrida* female, pointing towards the end of cell instead of straight downwards towards the outer disc of wing as in that species.

It has been said, under *Pieris brassicæ*, that no records of the earlier stages are known and that it is somewhat doubtful whether it is a Plains insect or not. This has elicited, from Mr. T. Bainbrigge Fletcher, Government Entomologist of the Agricultural Department at Pusa, the information that the butterfly has been reared in the Plains at Pusa and that "it occurs within about 100 miles of the Himalayas in Eastern and North Bengal, Bihar, the United Provinces and the Punjab."

Family—Lycænidæ.

This family of butterflies is composed of small to medium sized insects of which many are some shade of blue on the upperside, the males being generally brighter coloured than the females; some species are brown, others opper coloured, black, green (none in these papers however) or white and are often banded, striped, mottled or suffused. They all have the great advantage to classification or recognition of invariably being marked alike on the underside in both sexes whatever the difference in colour of the upperside so that there is little difficulty in connecting the males and females of any particular species. The shade of the underside ground-colour may differ somewhat but the markings never.

A.—Hind wing without tail or lobe of any sort, (see Pl. H, fig. 56).

a. Underside white, silvery white or light grey.

a^1. Size 1·5″ to 2″: male upperside with the ground-colour orange-red, the female with the ground-colour white .. *Curetis* (Pl. H, fig. 56♂, 56*a* ♀.) (17).

b^1. Size smaller: at most 1·36″.

a^2. Upperside blue, at least towards bases of wings, underside white spoted with black (in *akasa*, Horsf. there is very little blue sometimes: it is more greyish) .. .. .. *Lycænopsis*. (4)

b^2. Upperside dark brown or black without any blue; underside white or greyish-white, spotted with brown or black.

a^3. Underside, fore wing: pure white with the cell unmarked.. *Neopithecops*. (1)

b^3. Underside, fore wing: greyish-white with a single, dark dot in the cell .. .. .. *Megisba*. (3)

This represents the untailed form of *Megisba*; for the tailed form see under C. The amount of blue on the uppersides of *Lycænopsis* varies with the species: in the females it is always confined to the bases of the wings and there is always a large, white, discal area.

b. Underside some shade of brown as ground-colour, often very light.

a^1. Underside, both wings: brownish-white crossed by numerous, transverse, darker brown strigæ .. .. .. *Spalgis*. (2)

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA.

Explanation of Plate G.

Figs. 41, 41 a, Jamides bochus ♂ ♀.

,, 42, 42 a, ,, celeno ♂ ♀.

,, 43, 43 a, Nacaduba atrata ♂ ♀.

,, 44, 44 a, Catachrysops strabo ♂ ♀.

,, 45, 45 a, Tarucus plinus ♂ ♀.

,, 46, 46 a, Castalius rosimon ♂ ♀.

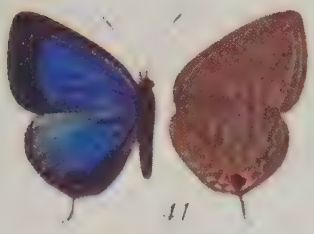
,, 47, 47 a, ,, decidia ♂ ♀

,, 48, 48 a, Talicada nyseus ♂ ♀

,, 49, Catachrysops cnejus ♂.

,, 50, 50 a, Tarucus theophrastes ♂ ♀.

,, 51, 51 a, Aphnaeus vulcanus ♂ ♀.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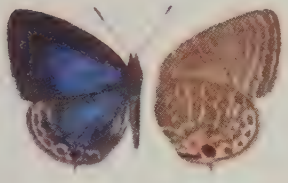
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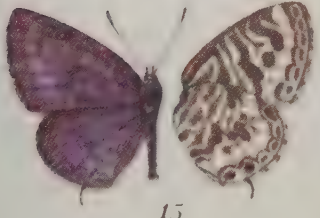
50a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18

18a

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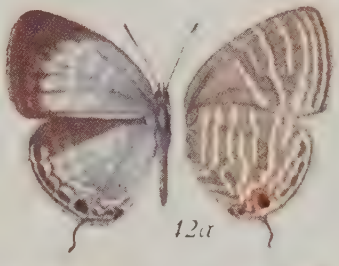
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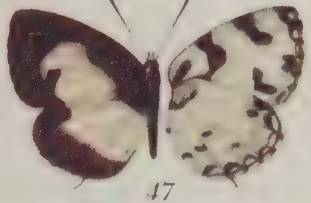
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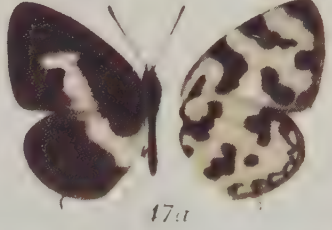
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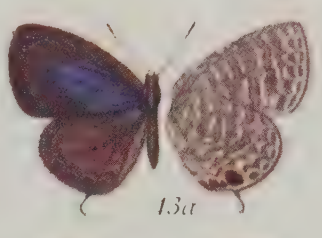
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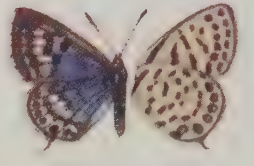
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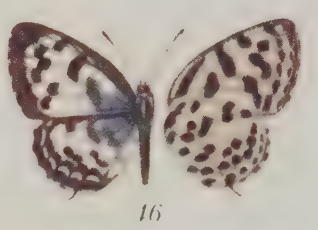
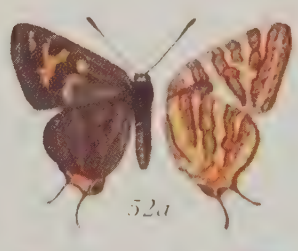

46

46a


52a

52

THE COMMON BUTTERFLIES OF THE PLAINS OF INDIA

Horace Knight, del

Hentschel-Colourtype.

b^1. Underside, both wings: with no such strigæ: with spots, bands, &c.

a^2. Underside, hind wing: with three subbasal dots, often black: one subcostal, one in base of cell, one towards inner margin: all in a row.

a^3. Underside, fore wing: with a postdiscal band formed by two parallel, white lines enclosing a strip of ground-colour .. *Azanus*. (6)

b^3. Underside, fore wing: with a series of postdiscal, generally dark-brown or black spots between veins (in *Chilades trochilus*, Frey. this series is more or less band-like, light, but each spot is dislocated from the other to form a band-like series with step-like margin).

a^4. Underside, hind wing: with a postdiscal series of well separated spots; underside, fore wing: with a white-circled dot just below costa between the mark on discocellular veinlets and the postdiscal series of spots (this costal dot is wanting in *Zizera otis* however) .. *Zizera*. (5)

b^4. Underside, fore wing: with no such dot, hind wing: the postdiscal series of spots band-like, irregular .. .. *Chilades*. (7)

b^2. Underside, hind wing: with no such dots; only whitish lines forming transverse bands .. .. *Nacaduba*. (11)

This *Nacaduba* includes only the one species *N. noreia*, Feld, which has no tail to the hindwing. For the tailed species, see C of this key.

B.—Hind wing with a short tooth or projection at ends of veins 1, 2, 3 showing merely as a projection in the fringe round the margin in *L. emolus*, Godart .. .. *Lycænesthes*. (9)

C.—Hind wing with a little thread-like tail at end of vein 2 on margin (see Pl. G, fig. 49).

a. Upperside: ground-colour uniform black with hinder half of wing orange .. .. *Talicada*. (Pl. G, fig. 49). (8)

b. Upperside: ground-colour white, brown or some shade of blue, generally with black or brown border of varying width and, in certain species, black spots.

a^1. Fore wing underside: cell unmarked inside the discocellular borders.

a^2. Underside, hind wing : 3 subbasal spots : one subcostal, one near inner margin and one between these and generally, a fourth below centre of costa, one or more of which may be black. In *Everes* the spot near inner margin may be very indistinct.

a^3. Underside, hind wing : with a postdiscal series of spots, always darker than the light-grey ground-colour, distinct and more or less separated, rarely in a shape of a band, the end one on inner margin always punctiform .. .. *Everes*. (10)

b^3. Underside, hind wing : with a postdiscal band, more or less broken with the end of it on inner margin elongate, not punctiform ; the band darker than the light brown ground colour .. .. *Catochrysops*. (13)

b^2. Underside, hind wing : with no such spots .. .. *Jamides*. (12).

b^1. Underside, fore wing : with the cell marked inside the discocellular streaks.

a^2. Underside, fore wing : with a single dot only in cell .. .. .. *Megisba*. (3).

This is the tailed form of *Megisba malaya*, Hors. ; the tailess form of the same species will be found under A of this key.

b^2. Underside, fore wing : with a band across cell formed by a strip of ground-colour included between white lines.

a^3. Underside, fore wing : the band across cell not continued below bottom margin of cell .. *Lampides*. (16).

The band across cell is really formed by two parallel ' brown ' ground-colour lines on a patch of whitish suffusion in this case.

b^3 Underside, fore wing : with the band across cell continued across the whole wing, formed by parallel, white lines on the brownish ground-colour .. *Nacaduba*. (11).

The tailed form of *Nacaduba* come here ; *i.e.*, all except *N. noreia*, Feld. which is under A.

c^2. Underside, fore wing : with a short or long streak in cell from base along its top edge.

a^3. Underside, hind wing : the whole surface more or less uniformly covered with dark dots, lines and bands on the white or yellowish ground-colour .. *Tarucus*. (14.)

b^3. Underside, hind wing: with a complete discal band of unsullied white ground-colour from inner margin to, at least, just before apex .. .. *Castalius.* (15).

The ground-colour of the upperside in males of *Tarucus* is concolorous, slatey-blue in *theophrastus*, F., and *plinius*, F.; dark-brown or blackish in *ananda*, de N. In *Castalius* the ground-colour is white with broad black borders and, in *rosimon*, F., a blue border to the black. The females in both genera have the ground-colour white like the males in *Castalius*, in *Tarucus* unlike.

D.—Hind wing: lobed or nearly so at anal angle and with only one tail (*see* Pl. H, figs. 54, 54*a*, 55, 57, 57*a*.).

a. Hind wing: the tail feathery, long as hind wing; colour deep velvety black on upperside in male with the tail cream-coloured brown in female, the tail white .. .. *Bindahara.* (38).

b. Hind wing with the tail broad and nearly half as long as wing; colour of both sexes alike, golden-yellow or orange-yellow with broad black border .. .. *Loxura* (*Pl. H, fig.* 55) (34).

c. Hind wing: tail broad and much shorter (*see* Pl. H, figs. 57, 57*a*). Colour on the upperside brilliant blue, with or without black border: blue, purple or brown in the female, with black border.

In *Surendra, Iraota, Mahathala* there are little points at the ends of the veins above the tail but these cannot be called tails.

a^1. Hind wing: costal margin (look at the underside of wing) before apex produced upwards to form a triangular tooth .. .. *Mahathala.* (20).

b^1. Hind wing: costal margin even.

a^2. Hind wing: the tail at end of vein 1 broader than a thread, the point at end of vein 2 in *Iraota* sometimes quite long.

a^3. Underside: variegated with grey and white on a rich chocolate ground which may shade into brownish towards outer margin .. .. .. *Iraota.* (18).

b^3. Underside: plain brown, rufous, &c., at most dark or blackish suffusion in places, the only distinct marking being a narrow, straight, line-like fascia from apex of fore wing curving to inner margin of hind wing; this fascia may be obsolescent sometimes .. *Amblypodia.* (21).

b^2. Hind wing with the tail at end of vein 2.

a^3. Both wings, underside: marked with distinct bands .. *Arhopala.* (22).

b^3 Both wings, underside: marked with lines, not bands.. *Surendra* male. (19).

d. Hind wing: the tail thread-like, at end of vein 2.

a^1. Fore wing, underside: with a narrow, discal band with straight margins from before middle of costa to, or near to inner margin before tornal angle, of even width throughout,: less than 2mm. in width at costa .. .. .. *Rapata.* (36)

b^1. Fore wing, underside: the band over 2mm. at costa, the margins more or less dislocated sometimes.

a^2. Upperside: rich red (male) or fine earth-brown (female), with broad, black border, always without sign of discal white or orange patch .. *Deudorix.* (35)

b^2. Upperside: colour dark slate-blue bright metallic blue (males) or brown suffused towards base of wings with slate-blue or bright blue (females); with orange or white, discal patch on fore wing sometimes. *Virachola.* (*Pl. H, figs.* 54, 54*a*.) (39).

E.—Hind wing with anal, lobe and two tails. (*see* Pl. G., figs. 52, 52*a*; Pl. H, figs. 53, 53*a*)

a. Hind wing: the tails feathery, long and ribbon-like and white.

a^1. Hind wing: the outer tail three times as long as the inner (the outer as long or longer than the hindwing) expanse of insect over 1·5" .. .. .. *Cheritra* (37).

b^1. Hind wing: the outer tail only half as long as inner tail (the longer hardly as long as the wing); expanse of insect 1·2" *Zeltus.* (30)

b. Hind wing: the tails ordinary, broadened, not long nor white .. .. *Surendra* female. (19)

This is the female of *Surendra* male under D; the female is brown on the upperside.

c. Hind wing: with outer tail at least thread-like, of ordinary length, the other never very long.

a^1. Underside, fore wing: the cell quite immaculate.

a^2. Underside, both wings: white with brown markings; a subbasal dot below costa of hindwing .. .. *Chliaria* (28)

b^2. Underside, both wings: silver, white, clear grey or rather light creamy brown, quite immaculate up to a thin, postmedial, dark line. (Pl. H, figs. 53, 53*a*).

a^3. Underside: creamy-brown with an indian-red, thin line to both wings postmedially; the males have a lobe on the inner margin of fore wing upon which, underneath are two tufts or pencils of hair, one above black and directed outwardly, the lower one attached to the edge of lobe being light ochreous; the male upperside is bright metallic blue, the female light sky-blue, both with a wide black apex to forewings .. .. .. *Creon.* (24).

b^3. Underside: silver or clear, pearly-grey with a dark, postmedial line at least to hind wing; the males with the inner (hinder) margin of fore wing convex at middle and, underneath, bearing a tuft of black hairs; the upper margin of hind wing bears also a large, glandular patch of scales at base of subcostal nervure. The males and females are similar to Creon as regards colouration of uppersides .. *Pratapa.* (25).

c^3. Underside: pure chalk-white as far as a postmedial line on both wings (*indra,* Moore), or a clear light grey with a thin, dark, postmedial line at least to the hind wing; males bright, brilliant, metallic-blue on the upperside or sky-blue (like female: *jehana,* Moore); females are brown (*indra,* Moore) or light-blue .. .. *Tajuria* (*Pl. H., figs* 53, 53*a*.) (26).

b^1. Underside, fore wing: the cell marked with transverse bands or spots which are continued across wings.

a. Underside: the transverse bands centred with silvery scales .. .. *Aphnæus* (*Pl. G, figs.* 52, 52*a*). (27).

b. Underside: the transverse bands or spots thinly edged with white .. .. .. *Zezius* male. (23).

The female of *Zezius* will be found under G; she is light blue on the upperside, the male being dull copper red.

F. Hind wing with lobe and three tails which are not very long and rather broad .. .. .. *Thaduka.* (29).

G. Hind wing with no lobe, or lobe very small and three thread-like tails.

a. Upperside: ground-colour dark brown; the underside: variegated inside a postmedial, white band profusely with white and black lines on an orange ground .. .. .. *Rathinda.* (31).

b. Upperside: ground-colour blue or brown (brown only in one species: *Horaga viola*, Moore).

a[1]. Underside, fore wing: brownish-yellow with a broad, white, transverse, discal fascia to both wings ..... *Horaga.* (33)

b[1] Underside, fore wing: with no fascia; wings traversed by bands, complete or broken.

a. Underside: the bands edged with silver.. *Catapœcilma.* (32)

b. Underside: the bands edge with white.... *Zezius* female. (23)

This section G contains butterflies with the lobe to the hind wing very small or entirely wanting; it is easily distinguishable in *Zezius*, is very small in *Horaga* and is quite negligible in *Rathinda* and *Catapœcilma*. The male of *Zezius* with only two tails is in E of this key.

1. Genus—Neopithecops.

Only one species, dark purplish-brown; paler on the disc; sometimes, in the dry season, with white, discal patch; underside white, with black markings. Size: 0.6″ to 1.1″ ..... *zalmora.*

The larva is normal, green in colour; the pupa normal, green or pinkish-brown blotched darker. Foodplant: *Murraya pentaphylla* of the *Rutaceæ*; feeding upon the flowers generally; larva attended by ants.

2. Genus—Spalgis.

One species only. Colour dull brown, darker towards apex, generally with a white patch on disc of fore wing; underside grey-brown with many darker strigæ. Size: 0·8″ to 1.3″ ..... *epius.*

The larva and pupa are normal in shape but the larva covers itself over with the dry skins and cottony fluff of the *Coccidæ* or scale insects among which it lives and upon which it feeds; it is one of the very few insectivorous larvæ known amongst the butterflies in India; it is certainly the only one known that will under no circumstances eat vegetable food.

3. Genus—Megisba.

Contains only one species, in appearance very like *Neopithecops zalmora*. Size: 0.9″ to 1·3″ ..... *malaya.*

The larva and pupa are unknown as is also the foodplant.

4. Genus—Lycænopsis.

There are five species occurring which may be met with in the Plains or hill stations of the Bombay Presidency. The commonest by far, however, is *puspa*.

A. Undersides in both sexes with the markings thin or small.

a. Male and female similar: the upperside fore wing white with broad, black border both with blue only at base. Size : 1·1″ to 1·14″ ..... *akasa.*

b. Male and female: upperside dissimilar; blue in the male; the females distinguished as under :—

a[1]. Upperside of male dull indigo-blue; the female with white discal patch to fore wing. Size : 1·34″ to 1·52″.... *albidisca.*

b[1]. Upperside of male uniform dark purplish-blue ; that of female bluish-purple, paler outwards. Size : 1·25″ to 1·40″.. *limbata.*

B. Undersides in both sexes with the markings prominent and coarse.

a. Underside slightly bluish-white, the veins very slenderly black. Size : 1·28″ to 1·36″.. *puspa.*

b. Underside opaque chalk-white, the veins concolorous. Size : 1·42″ to 1·45″ ..... *lilacea.*

The shape of the larva and pupa of *puspa* is normal, but the former is covered with minute, white, star-topped hairs ; the colour is generally green ; the pupa is pinkish with darker blotching. The food-plant is always leguminous : *Cylista* and others.

5. Genus—Zizera.

A. Fore wing, underside : a dot in the middle of cell.

a. Expanse : over 1·25″ mm. Upperside, male : light-blue, silvery in certain lights ; female, brownish black, sometimes purplish at base of wings. Size : 1·10″ to 1·23″ ..... *maha.*

b. Expanse : under 0·75″. Upperside, male, violaceous blue ; female, pale satiny-brown. Size : 0·7″ to 0·96″ ..... *lysimon.*

B. Fore wing, underside : cell immaculate.

a. Fore wing, underside : a spot on costa just before the discocelullar veins. Size : 0·8″ to 0·95″..... *gaika.*

b. Fore wing, underside : no such spot. Size : 0·8″ to 1·1″ ..... *otis.*

These are all Plains species and somewhat weak fliers. They are generally found flying near the ground, amongst grass, &c. The larva and pupa are normal, though both are rather thin, the former being flower-feeders and vary, therefore, in colour. *Lysimon* feeds on *Acanthaceæ* ; *gaika* and *otis* upon *Leguminoseæ*, mostly Vetches. The larvæ are attended by ants at times.

6. Genus—Azanus.

A. Fore wing, underside : a black dot in the middle of the cell. Size : 1″..... *jesous.*

B. Fore wing, underside : no dot in cell.

a. Underside : greyish-brown with, on the hind wing, a conspicuous, transverse, subbasal series of four black spots. Size : 0·8″ to 0·95″ ..... *ubaldus.*

b. Underside: greyish-white with, on the hind wing, these spots only slightly traceable. Size: 1″ to 1·1″ ..... *uranus.*

These are true butterflies of the Plains, never, seemingly, being found anywhere in jungles. They are all blue on the uppersides in the males and brown in the females. *Ubaldus* has, in the male, a patch of specialized scales on the disc of the fore-wing; *uranus* is probably only a seasonal form of it.

Larvæ and pupæ normal. The foodplant is *Acacia indica*, a species of the Plains. The larvæ are attended by ants.

7. Genus—Chilades.

A.—Hind wing, underside: with a row of, at least three, nearly marginal, perfectly round, black ocelli sprinkled with metallic scales, often an ochreous patch near tornus. Size: ·07″ to 1″ .. *trochilus.*

B.—Hind wing, underside: with no such ocelli. Size: 1·10″ to 1·26″ .. .. *laius.*

Laius is blue on the upperside in the male, in the female only at the base of the wings generally; *trochilus* always dark silvery brown.

Larvæ of both species normal as well as the pupæ. The larvæ of *laius* feeds on limes, of the other on *Heliotropum* (*Scrophulariaceæ*) and *Leguminoseæ*: vetches, and are attended by ants as a general rule.

8. Genus—Talicada.

Only one species. Size: 1·30″ to 1·60″ .. .. *nyseus* (*Pl. G, fig.* 49). A not uncommon insect though somewhat local.

Larva and pupa normal; foodplant: *Bryophyllum calycinum* of the *Crassulaceæ*; the larva feeds inside the fleshy leaves and is sometimes attended by ants.

9. Genus—Lycænesthes.

A.—Hind wing, underside: with a white-ringed well defined dark spot near base below the costa. Size: 1·1″ to 1·25″ .. .. *lycænina.*

B.—Hind wing, underside: no such spot. Size: 1·1″ to 1·3″ .. .. *emolus.*

Both these butterflies are hill species and may possibly be met with at the Hill stations on the Western Ghats.

Larvæ and pupæ normal. Larvæ attended by the common Red Ant (*Œcophylla smaragdina*, F.). Foodplants: *Wagatea spicata* and *Acacia pennata* for the former; *Cassia, Saraca, Heynea trijuga* and *Nephelium Litchi* for the latter.

10. Genus—Everes.

Only one species, found everywhere, most commonly away from jungles. Colour blue of some shade, occasionally nearly completely brown in the female on upperside. Size: 0·9″ to 1·2″ .. .. .. *argiades.*

Larva and pupa normal. Foodplant: *Laguminoseæ.*

11. Genus—Nacaduba.

A.—Expanse under 1″ .. .. *ardates.*

B.—Expanse over 1″.. .. .. *atrata.* (*Pl. G, figs.* 43 ♂, 43*a* ♀.)

The colour of the males upperside is dark slaty-purple, the female dark brown with the disc whitish, suffused with blue in both species; the undersides are light brownish with darker bands defined by whitish lines, of *ardates* the ground-colour is sometimes fawn.

Larvæ and pupæ normal, the former attended by ants. Foodplants: *Acacia* in the case of *ardates*, mainly the flowers being eaten; *Embelia robusta* for the other.

12. Genus—JAMIDES.

A.—Upperside: brilliant blue in the male, paler and not brilliant in the female; both wings with a brown border. Size: 1·25″ to 1·5″ .. .. *bochus.* (*Pl. G, figs.* 41 ♂, 41*a* ♀.)

B.—Upperside: pale bluish-white in both sexes, with dark-brown borders. Size: 1″ to 1·6″ .. *celeno.* (*Pl. G, figs.* 42 ♂, 42*a* ♀.)

There is another species, like *celeno* but with a wash of brilliant blue over the white, called *elpis*, found in the hills of Western India: the larva feeds upon cardamoms. Both *bochus* and *celeno* are Plain species.

Larvæ and pupæ normal; attended by ants occasionally. Foodplants: *Leguminoseæ*, generally the flowers.

13. Genus—CATACHRYSOPS.

A.—Fore wing, underside: a dot on costa between discocellulars and postdiscal band of spots. Size: 1″ to 1·5″ .. .. *strabo.* (*Pl. G, figs.* 44 ♂, 44*a* ♀.)

B.—Fore wing, underside: no such dot on costa.

a. Hind wing upperside: two distinct black ocelli just inside margin near tornus. Size: 1″ to 1·3″ .. .. *cnejus.* (*Pl. G, figs.* 50 ♂, 50*a* ♀.)

b. Hind wing, upperside: only one of these ocelli distinct, rarely both. Size: 0·9″ to 1·25″ .. .. *pandava.*

Are all three common Plain insects, but are found also in the jungles and hills. The first two are light-greyish on the underside, *pandava* rather dark brownish; upperside in the males of the first two is pale violet or pale purplish, of the females brown, the disc in *strabo* female being whitish, the base shot with blue in the females of both species; upperside of male *pandava* lavender-blue, female like that of *cnejus*.

Larvæ and pupæ normal, attended by ants generally; foodplant: *Leguminoseæ*, such plants as *Butea frondosa*, *Acacia*, &c., generally, the flowers being eaten; but the larvæ of *strabo* are found on other things also. Figured on Pl. II, figs. 21, larva 21*a*, pupa of *cnejus*.

14. Genus—TARUCUS.

A.—Underside of hind wing: a continuous line bordering the terminal row of spots on the inside.

a. Underside, hind wing: the terminal row of spots all metallic blue. Size: 0·8″ to to 1·20″ .. *theophrastus.* (*Pl. G, figs.* 51 ♂, 51*a* ♀.)

b. Underside, hind wing: the terminal row of spots dark brown. Size: 0·8″ to 1·2″ .. *plinius* (*Pl. G, figs.* 45 ♂, 45*a* ♀.)

B.—Underside of hind wing: no continuous line bordering the terminal row of spots. Size: 0·8″ to 1·2″ .. .. *ananda.*

The two first species are found everywhere, in the Plains and in the hills, in the jungles and in the dry, waste places of India, being rarer, however, in the jungle tracts. *Ananda* is a hill species, plentiful in Kanara. The males of the first species are pale purple to violet-blue on the upperside; of the second dark violet; *ananda* is deep-purple with the spots showing through from the underside; the females of the first two are blackish-brown with white discal markings, both wings shot with blue towards the base, to a greater extent in *theophrastus* than in the other; female *ananda* is suffused over the whitish disc with brown and is also shot with blue towards base.

The larvæ and pupæ are quite normal and are greedily attended by ants, generally of the genus *Cremastogaster*; so much are these insects necessary to the comfort of *theophrastus* and *ananda*, indeed, that the genus of the foodplant seems to be of little importance as long as the ants are there. *Plinius* has been bred on flowers of *Albizzia* and *Sesbania*; the other two on Rhamnacæ (*Zizyphus*) and other plants, such as Mistletoe, Jasmine, &c.

15. Genus—Castalius.

A.—Hind wing, underside: outer margin with a lunulate black line and no regular row of black spots inside it. Size: 1·1″ to 1·35″ .. *decidia.* (*Pl. G, figs.* 47 ♂, 47*a* ♀.)

B.—Hind wing, underside: outer margin with no lunulate black line but a regular row of black spots instead of it.

a. Hind wing, underside: with a single row of black spots inside the marginal one. Size: 1·1″ to 1·25″ .. .. *ethion.*

b. Hind wing, underside: with three rows of black spots inside marginal row. Size: 1·1″ to 1·35″ .. .. *rosimon.* (*Pl. G, figs.* 46 ♂, 46*a* ♀.)

These butterflies are really not separable from *Tarucus*. All but *rosimon* are hill insects, *decidia* being, however, found sparingly in the Plains. The males are like the females in colouration as a rule; *ethion* male differing from its female by having a blue edging to the broad black border, differing also from both sexes of *decidia* in this. Both species differ from *rosimon* by the broader, more even-edged black border to wings and by not being shot with blue at the base.

The larvæ of all are normal; so are the pupæ; they are all attended by ants. The foodplants of the species is generally some species of *Zizyphus* of the family *Rhamnaceæ*.

16. Genus—Lampides.

Only one species. Size: 1·25″ to 1·40″ .. .. *bœticus.* (*Pl. G, figs.* 48 ♂, 48*a* ♀.)

A widely distributed insect, found throughout the Old World. Male: violet-blue above with a minutely frosted appearance; female upperside, brown with, sometimes, bluish sprinkling towards bases of wings. Underside pale greyish or brownish ochreous with bands.

Larva and pupa normal. Foodplant: *Leguminoseæ* of many kinds; the flowers being eaten. Larva is attended by ants.

17. Genus—Curetis.

A. Underside: white, not silvery. Size: 1·25″ to 1·4″ .. .. *thetis.* (*Pl. H, Figs.* 56 ♂, 56*a* ♀.)

B. Underside: silvery-white, powdered sparsely with black dust. Size: 1·8″ to 2″ .. .. *bulis.*

Thetis may be found anywhere; *bulis* is more or less confined to the hill tracts and jungles. The males of both are dark glossy cupreous-red. females white, both with black borders.

The larvæ and pupæ are abnormal, never attended by ants; see Introductory part of these Papers, paragraph 2 on page 29 (14) of Vol. XIX, Part 1 of the 15th April 1909 of this Journal. The foodplants are all *Leguminoseæ*. *See* Pl. II, figs. 28, larva; 28*a*, pupa.

18. Genus—Iraota.

Only one species. Size: 1·5″ to 2″ .. .. *timoleon.*

Male upperside deep metallic-blue with broad black border, female same blue but not metallic, also with border.

Larva and pupa normal, attended by ants sometimes. Foodplant *Ficus indica*, the common Banyan: the young shoots and tender leaves.

19. Genus—Surendra.

Only one species. Size: 1·55″ to 1·62″ .. .. *quercetorum.*

Male purplish-blue, broad black border; female brown. This is a hill insect, never, as far as information goes, found in the plain country.

Larva flattened with segments 3 and 4 somewhat prominent; pupa normal; attended by ants. Foodplant: *Acacia cæsia* and *pennata.*

20. Genus—Mahatpala.

There is only one species. Size: 1·6″ to 1·9″ .. *ameria.*

The insect is said to have been captured in Calcutta and, for that reason, it is mentioned here. Nothing is known about its transformations.

21. Genus—Amblypodia.

Only one species. Size: 1·6″ to 2″ .. .. *anita.*

Males, upperside deep purple with narrow black border to wing. Females have the disc brighter blue from base, outer area dark-brown, or the whole wings dark-brown. Underside of various shades of brown, red-brown or ochreous.

Larva of the type of *Surendra* rather, but deeper, narrowed in after-part so as to resemble a shoe in outline, oily yellow-green with electric-blue longitudinal bands; pupa normal, stout; never attended by ants. Foodplant: *Olax scandens*. *See* Pl. II, figs. 22, larva; 22*a*, pupa.

This is not a Plains butterfly but may possibly be met with in the hill stations of the Western Ghats.

22. Genus—Arhopala.

A. Size large: 2″ to 2·5″.

a. Fore wing, underside: markings blurred and indistinct to a large degree, the spots in the cell only recognisable as such by their borders of white .. .. .. *centaurus.* (*Pl. H, figs.* 57 ♂, 57*a* ♀.)

b. Fore wing, underside: the markings clear and well defined, the spots in the cell darker than the ground-colour .. .. *amantes.*

B. Size smaller: 1·4″ to 1·7″ .. .. .. *hewitsoni.*

These are our brightest "Blues", and the largest; the males are very brilliant, with narrow black borders to wings, the females less so with broad black borders. They are very powerful fliers and difficult to catch. *Hewitsoni* is not found in South India, the other two are, though *amantes* is apparently confined to the hills.

The larvæ are much flattened, the pupæ are normal; the two first species are much attended by Red Ants: *Œcophylla smaragdina* in the nests of which the pupation often takes place. The foodplants are, generally, *Terminalia tomentosa* and *paniculata* of the Family *Combretaceæ*; but, the ants seemingly being necessary to the health of the larvæ, these latter have been found also on *Xylia dolabriformis* and other *Leguminoseæ* as also on *Layerstrœmia* of the *Lythraceæ*. *See* Pl. II, figs. 23, larva; 23*a*, pupa.

23. Genus—Zesius.

Only one species. Size: 1·3″ to 1·9″ .. .. *chrysomallus.*

The male is pale cupreous-red with outer margins brownish, the female, larger, is brown shot with blue at base of wings.

The larva is abnormal, of the shape of *Arhopala* but with the front and hinder segments dilated into teeth; pupa normal; attended constantly by Red Ants, without which the larva will not live in health; pupation nearly always in the ants' nest. Foodplant: generally *Combretaceæ*. The larvæ are regular cannibals, eating each other and the pupæ whenever they get a chance.

24. Genus—Creon.

One species. Size: 1·2″ to 1·5″ .. .. .. *cleobis.*

A hill species. The larva is somewhat abnormal, being in shape like that of *Amblypodia*; the pupa is attached by the tail, the anal segments being lengthened and broadened out at the extremity like a horse-shoe for the purpose, and stands out free from the support. Foodplant; *Loranthus* generally *L. scurrula.*

25. Genus—Pratapa.

One species. Size: 1·2″ to 1·5″ .. .. ..*deva.*

Also a hill species. The larva is like that of *Creon* above and so is the pupa. There is another butterfly which occurs in Kanara but is very rare even there, which has a larva and pupa very like this species, namely. *Ops melastigma.* It is larger than *P. deva* and has a large black stigma on the disc of the forewing on the upperside; it is brown-creamy in colour on the underside.

Another species, known as *Tajuria argentea,* Aur., is also found in Kanara but it is a *Pratapa,* not a *Tajuria,* having the same velvety larva. not a naked one las in the latter genus. The larvæ of *Creon* and *Pratapa* are pink-brown, as is also that of *Ops,* while that of *argentea* is green.

26. Genus—Tajuria.

A. Underside: the outer half of both wings brown, separated sharply from the pure-white basal half. Size: 1·4″ to 1·8″ .. *indra.*

B. Underside: whole surface uniform.

a. Hind wing, underside: with metallic greeny-blue scales on black tornal spots and between them. Size: 1·2″-1·8″.. .. .. *cippus.* (*Pl. H, figs.* 53 ♂, 53*a* ♀.)

b. Hind wing, underside: with some light blue scales between the spots, never metallic. Size: 1·2″-1·5″ .. .. *jehana.*

The males of *indra* and *cippus* are deep metallic-blue on the upperside, the female of the former is dark-brown, of the latter light-blue with broad black border; both sexes of *jehana* are rather like the female of *cippus*: light-blue.

The larvæ are of the same type as those of *Camena*, so are the pupæ; and, like those, are hardly ever attended by ants; the foodplant is also *Mistletoe*. *See* Pl. II., figs. 23, larva; 23*a*, pupa.

27. Genus—Aphnæus.

A. Hind wing, underside: with the subbasal band quite regular and entire, never broken; colour upperside: brown with orange markings. Size: 0·8″ to 1·5″ .. .. *vulcanus.* (*Pl. G, figs.* 52 ♂,52*a* ♀.)

B. Hind wing, underside: with the subbasal band broken, generally into three spots, never regular or entire.

a. Fore wing, upperside: very dark slaty-blue in male, or dark-brown in female, bordered broadly with black, the markings of underside showing dimly through, though never yellow. Size: 1·2″ to 1·8″ .. .. .. *lohita.*

The dry-season form of this has been designated ordinarily as a different species: *A. concanus.*

b. Fore wing, upperside: pale lilacine-blue in male, pale-brown in female, with broad darker border; markings of underside showing through much paler. Size: 1·1″ to 1·5″. *lilacinus.*

c. Fore wing, upperside: brown with large triangular orange patch before apex, reaching the costa, markings of underside showing through on it as black spots and bands. Size: 1·35″ .. .. *ictis.*

A. elima is probably the dry-season form of this, being much paler underneath both as to ground-colour and markings.

d. Fore wing upperside and hind wing: chiefly orange, markings of underside showing through as black spots and bands throughout. Size: 1″-1·6″ .. .. *hypargyrus.*

All but *lohita* and typical *ictis* are Plains butterflies, these two being chiefly confined to the hills. They are all very fast fliers and cannot be mistaken for any other *Lycænid* owing to the generally bright undersides, always with metallic scales bordering the bands.

The larvæ are abnormal, with tubercles; pupæ normal; much attended by ants; the foodplant is chosen, indeed, on account of the ants.

28. Genus—Chliaria.

A.—Fore wing, underside: a dot inside the costa above middle of cell. Size: 0·9″ to 1·2″ .. .. *othona.*

B.—Fore wing, underside: no such dot. Size: 1·1″ to 1·3″ .. .. *nilgirica.*

These are both hill species. *Othona* male is sky-blue on the upperside; the female is dusky brown with the hinder third of the hindwing suffused

with grey. *Nilgirica* male is reddish-brown, glossed with purple in some lights ; the female is dull smoky blackish.

The larva of *othona* which is the only species bred, is of normal shape except that it has a pair of well-separated, short tail-points ; it is generally red in colour. The pupa is normal. The foodplant is Orchids, the most common being *Cottonia, Ærides crispum* and *Rhynchostylis,* the flowers generally being eaten. Ants sometimes attend the larvæ.

29. Genus—Thaduka.

One species. Size : 1·6″ to 1·9″ .. .. .. *multicaudata.*

Male and female alike on the upperside : brilliant azure-blue, bordered broadly black.

Larva arrhopaline ; pupa normal. Foodplant : *Trewia nudiflora* of the *Euphorbiaceæ.* The caterpillars are gregarious.

30. Genus—Zeltus.

One species. Size : 1·2″ to 1·5″ .. .. .. *etolus.*

This is not a butterfly of the Plains. The male is black with long feathery white tails ; the female is brown with similar tails. Transformations unknown.

31. Genus—Rathinda.

One species. Size : 0·95″ to 1·3″ .. .. .. *amor.*

Not a Plains species either ; though it may be found on the borders. It is sure to be found in all hill stations.

Larva abnormal with long, dorsal and lateral, fleshy processes ; pupa like that of *Tajuria, Creon,* &c. Foodplant : *Ixora, Croton, Blachia, Loranthus,* &c., &c. *See* Pl. II., figs. 27, larva ; 27*a*, pupa.

32. Genus—Catapœcilma.

One species only. Size : 1·1″ to 1·4″ .. .. *elegans.*

Male, upperside : dark violet-blue ; female, pale violet-blue, the first bordered narrowly black, the second broadly.

Larva and pupa normal ; very much frequented by ants. Foodplant : *Terminalia paniculata* of the *Combretaceæ.*

33. Genus—Horaga.

A.—Underside, both wings : with a broad white, oval fascia crossing them. Size : 1·15″ to 1·35″ .. *onyx.*

B.—Underside : a white spot only on the fore-wing. Size : 0·9″ to 1″ .. .. *viola.*

Both hill species, found in Kanara. Transformations unknown, at least for the Bombay species.

34. Genus—Loxura.

Only a single species. Size : 1·25″ to 1·8″ .. *atymmus.* (*Pl. H, fig.* 55.)

Upperside florid orange to saffron-yellow with fuscous margins to wings.

Larva and pupa of the type of *Pratapa* ; attended by ants. Foodplant : *Dioscorea pentaphylla,* one of the Yams.

35. Genus—Deudorix.

One species. Size : 1·4″ to 2″ .. .. .. *epijarbas.*

Male dark orange-scarlet on upperside ; female fuscous-brown ; both with a broad, dark brown border to wings. A fast flier.

The larva is somewhat of the type of *Pratapa* but has the anal segment flattened slantingly; pupa normal. Foodplants: *Pomegranate, Connarus*; the larva living inside the fruits and feeding there; occasionally visited by ants.

36. Genus—Rapala.

A.—Upperside, both wings: scarlet; female brick-red, with black borders. Size: 1·3″ to 1·6″ .. *melampus.*

B.—Upperside, both wings: blue in both sexes.

a. Underside, both wings: with postmedial band narrow: under mm. Size: 1·1″ to 1·5″ .. .. *schistacea.*

b. Underside, both wings: with the postmedial band broader: over mm. Size: 1·1″ to 1·5″ .. .. *orseis.*

These last two are very like each other, the male of the first is dark slatey-blue on the upperside, the disc of hindwing shot with brilliant blue in some lights; the female is purple-blue. *Orseis* male has the upperside dark brown, glossed with dull indigo-blue; hindwing not shot; female lighter blue. They are all fast fliers, fond of flowers.

Larva abnormal, being tuberculate-toothed; the pupæ are normal. Foodplants: *Leguminoseæ, Rhamnaceæ, Combretaceæ*, the flowers being eaten. The larvæ are sometimes attended by ants. *See* Pl. II, figs. 24, larva; 24*a*, pupa.

37. Genus—Cheritra.

One species. Size: 1·6″ to 1·8″ .. .. .. *jaffra.*

A hill species, very common, however, where it occurs. It is very fond of the flowers of species of *Lea* of the *Vitaceæ*.

Larva abnormal, shape of *Pratapa* but with teeth along dorsal line; the pupa is also like that of *Pratapa*, freely suspended or fixed by tail only. The foodplants are Cinnamon, *Xylia, Ixora*, many trees, the young leaves being eaten. *See* Pl. II, figs. 25, larva; 25*a*, pupa.

38. Genus—Bindahara.

One species. Size: 1·2″ to 1·6″ .. .. .. *sugriva.*

Male dark velvet-black on the upperside with the latter half of the hindwing margined somewhat broadly brilliant dark-blue; the tails cream-coloured. The female is brown, the margin of hindwing white where the male is blue; the tails pure white. The males are fond of *Lea* flowers also like *Cheritra*.

Larva like that of *Deudorix* exactly, feeding inside fruits of *Salacia* pupa normal; both occasionally visited by ants.

39. Genus—Virachola.

A.—Upperside; brilliant light-blue with broad, black border; often a discal, orange spot on fore wing in the male, white spot always present in the female in the same place. Size: 1·4″ to 1·9″ for male, 1·8″ to 2·8″ for female .. *perse.*

B.—Upperside: dark violet-blue or violet-brown, the female with an orange discal spot on fore-wing. Size: 1·5″ to 2″ .. .. *isocrates.*

Large rapidly flying butterflies, fairly common everywhere.

Larva like those of *Deudorix*, feeding in fruits of the same kind; *R. dumetorum*, Tamarind, even *Nuxvomica*.

(To be continued.)

NOTE ON FERNS COLLECTED AT PACHMARHI, C.P.

BY

R. J. D. Graham, Economic Botanist, C.P.

General.—The following note is the result of collecting tours made in October 1911, May 1912 and June 1914. The object of the tours was to collect ferns for the Public Gardens, Pachmarhi. So successful were the collections yielding from a comparatively small area the large number of 41 species that it has seemed worth while placing the results on record. The absence of any records of the Cryptogamic Flora in the Central Provinces furnishes an additional excuse for publishing the note. At the same time the hope is expressed that the present list may form the starting point of a detailed survey within the limits of these Provinces of this most interesting and graceful group of plants.

Situation.—Pachmarhi, the summer residence of the Local Administration, is situated in 22° 28′ N. and 78° 26′ E. on a plateau in the Mahadeo Hills of Satpura Range. The town gives the name to the plateau and surrounding country, the area extending to 23 square miles of which 12 square miles are occupied by the plateau. The elevation of the plateau is roughly 3,500 ft.; the encircling hills rise in places to 4,500 feet while the ravines descend at least 1,000 feet. Pachmarhi is reached by a road 32 miles long running to the south from Piparia station on the main line between Itarsi and Jubbulpore.

Topography.—The plateau surrounded by its higher hills from which, however, it is separated by deep ravines, is somewhat cup-shaped. The deep and wild ravines which radiate from all sides contrast sharply with the parklike plateau where grassy vistas among trees of *Shorea robusta*, Gærtn., *Terminalia tomentosa*, Bedd., and *Eugenia jambolana*, Lamk., present a very homelike aspect. It is to the ravines or khuds that one must turn in the search for ferns though very xerophyllous forms occur on the plateau itself. So narrow are the khuds in places with their wall-like sides towering to a height of over 1,000 feet that the sun reaches the depths for but a few hours, minutes in some places, daily. Running at the foot of the khuds are perennial crystal streams which with the half shade furnish the moisture necessary for a natural conservatory. No adequate description of the grandeur of the scenery can be conveyed in a few lines. Those who have not been privileged to see the glories of Pachmarhi may glean a faint idea of the reality from the first chapters of "The Highlands of Central India."

Geology.—The rock is a sandstone of enormous thickness known as the Pachmarhi sandstone belonging to the Mahadeva group of the upper Gondwana series. The thickness has been estimated at

8,000 feet. The strata have a dip of 100° to the North. The sandstone is readily denuded hence the formation of the characteristic ravines which start abruptly from the edge of the plateau with a sheer drop of anything up to 1,000 or 1,500 feet.

Climate.—The highest temperature recorded is 104° F. in June, the lowest 30° F. in December. The average day temperature in the cold weather is 71·3° F., dropping at night to 47·5° F. In the hot weather the average maximum is 93·1° F. and the minimum 75·1° F. In the ravines the temperature is more uniform. The rainfall is heavy averaging 77 inches annually. The rains commence early in June and continue into October.

Notes of the Fern Flora.—As mentioned above, the full glory of the ferns is to be seen in the shady moist-ravines. There the beautiful tree ferns *Cyathea spinulosa*, Wall., *Alsophila glabra*, Hook., and *Angiopteris evecta*, Hoffm., flourish, the first raising its feathery crowns to a height of 15-20 feet. On the banks where the soil has collected are the humbler but not less graceful herbaceous species. Growing on the gravelly margins of the streams are clumps of the Royal Fern (*Osmunda regalis*, Linn.) while on the half submerged rocks *Acrostichum lanceolatum*, Hook., finds a home. In the spray of the water falls Maiden Hair (*Adiantum capillus-veneris*, Linn.) flourishes, while on the higher levels occur *Nephrolepis cordifolia*, Bak., and *Nephrolepis exaltata*, Schott., protected in the less humid conditions by their cuticularised fronds. On the more open stretches where gravel and sand have been deposited *Equisetum debile*, Roxb., a horse tail pushes its rhizomes, contrasting strangely in its rigid xerophyllous stems, with its hygrophyllous relations. *Psilotum triquetrum*, Sw., flourishes in places in the cracks in sheer walls, justifying its xerophyllous structure by the places where it finds a home.

Amongst the rocks on the plateau the commonest ferns, the Silver fern, (*Cheilanthus farinosa*, Kauff.) and *Adiantum caudatum*, Linn., the Strawberry maiden hair, so called from its runner-like fronds. The hypogeal parts of both are annual, the former is further protected in the dry positions in which it grows by the silvery coating of hairs on the under surface of the leaves and the habit of rolling its leaves in the dry season with the dorsal surface uppermost, the latter by a covering of hairs and its prostrate habit. *Adiantum lunulatum*, Burm., being without these protections exists only in the wet season. *Nephrodium odoratum*, Bank., is a graceful fern with annual fronds, the half-exposed rhizome being protected by a thick covering of chaffy scales. *Lygodium pinnatifidum*, Sw., is an interesting climbing fern, the annual leaves being heavily cuticularised. The hardiest fern of all is *Polypodium lineare*, Thumb. var. *simplex*, Sw., whose simple, almost leathery, leaves rolled from the margin with the cuticularised ventral surface outwards

persist even in the hot weather. *Selaginella proniflora*, Bak., is a delicate plant in shady places while *S. rupestris*, Spring., found not very far from Pachmarhi is interesting because of its habit of rolling up into a ball in the dry weather. Placed in water the balls unfold into green rosettes. *Lycopodium cernuum*, Linn., is a graceful little marsh plant resembling a miniature fir tree found at Pagara a few miles from Pachmarhi.

In conclusion I have to express my thanks to Mr. M. S. Ramaswamy, Officiating Curator of the Herbarium, Royal Botanic Gardens, Sibpur, Calcutta, for comparing and verifying the names of the ferns included in the list.

List of Vascular Cryptogams.

Order Filices.

Sub order ... Gleicheniaceæ.
Gleichenia linearis, Linn.
Sub order ... Polypodiaceæ.
Tribe ... Cyatheæ.
Cyathea spinulosa, Wall.
Alsophila glabra, Hook.
Tribe ... Davallieæ.
Davallia tenuifolia, Sw.
Davallia strigosa, Sw.
Tribe ... Lindsayeæ.
Lindsaya ensifolia, Sw.
Tribe ... Pterideæ.
Adiantum lunulatum, Burm.
Adiantum caudatum, Linn.
Adiantum capillus-veneris, Linn.
Cheilanthus farinosa, Kauff.
Pteris quadriaurita, Retz.
Tribe ... Blechneæ.
Blechnum orientale, Linn.
Tribe ... Aspleniæ.
Asplenium esculentum, Presl.
Asplenium latifolium, Don.
Asplenium heterocarpum, Wall.
Actinopteris dichotoma, Bedd.
Tribe ... Aspideæ.
Aspidium amabile, Bl.
Nephrodium calcaratum, Hook.
Nephrodium calcaratum, var. sericea, Bedd.
Nephrodium calcaratum, var. falciloba, Bedd.
Nephrodium cochleatum, Don.
Nephrodium sparsum, Don.
Nephrodium odoratum, Bak.

Nephrodium cicutarium, Bak.
Nephrodium extensum, Hook.
Nephrodium molle, Desv.
Nephrolepis cordifolia, Bak.
Nephrolepis exaltata, Schott.

Tribe ... Polypodieæ.
Polypodium multilineatum, Wall.
Polypodium obliquatum, Bl.
Polypodium lineare, Thumb. var. simplex, Sw.

Tribe ... Acrosticheæ.
Polybotrya appendiculatum, Sw.
Acrostichum lanceolatum, Hook.

Sub order ... Osmundeæ.
Osmunda regalis, Linn.

Sub order ... Schizeaceæ.
Lygodium pinnatifidum, Sw.

Sub order ... Marattiaceæ.
Angiopteris evecta, Haffm.

Order Equisetineæ.

Sub order ... Equisetaceæ.
Equisetum debile, Roxb.

Order Lycopodineæ.

Sub order ... Lycopodiaceæ.
Lycopodium cernuum, Linn.
Psilotum triquetrum, Sw.

Sub order ... Selaginellaceæ.
Selaginella ruprestris, Spring.
Selaginella proniflora, Bak.

NOTES ON SOME NEW AND INTERESTING BUTTERFLIES FROM MANIPUR AND THE NAGA HILLS.

BY

LIEUT.-COL. H. C. TYTLER, 17TH INFANTRY.

PART II.

Subfamily—*Nymphalinæ*.

EULEPIS LISSAINEI, n. sp. (Pl. I, Fig. 4 ♂).

This belongs to the *Marcæa-Meghaduta* group and may possibly be the dry-season form of the latter, but as I failed to take it in the wet-season it is better to keep it distinct for the present. From *marcæa*, which I only know from Seitz's figure, it differs on upper forewing in having the spot beyond the cell much larger and the spots on the black terminal border quite separate with their *inner* edges even and *outer* edges conical. In *marcæa* it is not so, the spots are continuous forming a greenish band, the *outer* edge being straight and the *inner* edge forming a row of rounded or conical projections. On the hindwing the subterminal black band is much narrower and there is a terminal row of black spots somewhat as in *meghaduta*, but which is quite wanting in the figure of *marcæa*. The anal angle has two black spots placed on the green colour, whereas in *marcæa* only one spot is shown placed on a pinkish ground. In size it differs greatly being very much smaller.

From *meghaduta*, which I also only know from Seitz's figure, vol. ix, pl. 135*a*, it differs in being much smaller and less heavily marked. The dusky area on *upperside* near base of forewing and along vein 1 of hindwing is entirely wanting. On *upper* hindwing the terminal black line, broad and distinct in *meghaduta*, is much reduced and entirely wanting at the apex. The subterminal spots so well marked in *meghaduta* are also much reduced near tornal angle and obsolescent or entirely wanting near the apex.

Underside: ground colour pale yellowish green. Forewing costa, except near apex and termen, broadly chocolate; a similar subterminal chocolate band outwardly margined with blackish; a subcostal band as on *upperside* commencing at the subterminal band and continued along vein 4 and lower edge of cell to just below base of vein 2, and joined to the costal chocolate band by a similar band along the discocellulars, both margined with black. Hindwing: a submarginal band edged with blackish from costa to tornus; a subbasal similar band continued along vein, and joining the submarginal band a terminal narrow chocolate band, rather paler towards the apex, inwardly; margined with small rather obsolescent black spots; and finally a small black spot on dorsum on the inner edged of the submarginal band.

Expanse: ♂ ♂ 2·52—2·73″.

Sixteen males taken near Phesima, Naga Hills, at about 6,000′ at the end of April, May and the beginning of June.

APATURA SORDIDA, Moore.

Rather common in the Manipur valley where numerous specimens of both sexes were taken more or less throughout the summer and autumn. A single specimen was also obtained on the Silchar Road in October. It is extremely local.

APATURA SORDIDA NAGA, sub-sp. nov. (Pl. I, Fig. 3 ♂).

Male. *Upperside*: very similar to the typical form but the wings are of somewhat different shape. Forewing: termen not so emarginate; Macular

band *pale yellow* and *not pure white* as in typical form. Hindwing: termen round and not emarginate near tornus; tornal ocellus not ringed and very indistinct. *Underside*: rather greyer than typical form with a distinct golden sheen along terminal area. Forewing: a blue centre to the ocellus and cell closed by a brown bar. Hindwing: the discal brown band very concave near the costa and the white spots outwardly further placed from the discal band than in typical *sordida*.

Expanse: ♂ 2·45—2·9″.

A single ♂ was taken at Yakama, Naga Hills, at about 6,000′ in June; three ♂♂ at the same place in September and seven more in October.

A very distinct and well marked race which apparently flies at a much higher elevation than the typical form which in Manipur flies at about 2,600′.

The specimen of *A. sordida* recorded by me from the Naga Hills, J. B. N. H. Soc., vol. xxi, p. 56, is probably referable to this race. I am unable to compare it as I left it behind in England.

APATURA ULUPI, Doherty.

A single male of this rare butterfly was taken by Captain Porter on the Dihang River, Abu Hills, in June, and is now in my collection.

APATURA FLORENCIÆ, n. sp. (Pl. II, Fig. 10 ♀).

Female. *Upperside*: both wings termen rounder than in the male; ground colour dusky green. Forewing: outer half dark brown; no spot in cell, markings otherwise placed as in male but pale creamy yellow in colour with the exception of the submarginal spot in inter space 2 and the marginal line near the tornus which are tinged with darker yellow. Hindwing: markings as in male but bases of interspaces 5 and 6 not paler than rest of the wing. *Underside*: both wings pale silvery bluish green. Forewing: no pale diffuse spot in cell; markings otherwise as in male but almost pure white in colour; the discal spots and those placed beyond the cell inwardly margined with dark purplish black. Hindwing: markings as in male but discal band straighter.

Expanse: ♀♀ 2·85—3·05″.

♀ Variety *albopunctata*, n. v. *Upperside*: the spots are all white with no tinge of cream colour.

The female is very rare and only six specimens were obtained in August and September at about 6,500′.

The males are not so rare as I thought, though very local, and many specimens were taken near Jakama in the Naga Hills during July, August and September and a few at Kirban and Takabama where I had not previously met with it.

This species will, I think, prove to be a race of *A. ulupi*, Doherty.

APATURA MANIPURIENSIS, n. sp. (Pl. II, Figs. 11, 12; ♂ ♀.)

Male. *Upperside:* both wings smoky brown with hyaline very pale markings, slightly tinted with mauve reflections, and almost devoid of scales in places. Forewing: termen deeply excavated at its middle; cell and base of interspaces 2 and 3 hyaline dusted with pale brown scales; a brown streak, sometimes divided in two, in the middle of the cell and another similar streak closing it; a broad hyaline post median area, almost reaching the termen, inwardly sharply defined and outwardly diffuse bearing a large black spot in interspace 2, a very small and indistinct spot sometimes in interspace 3 and a large brown diffuse patch in interspace 1; a preapical pale spot in interspace 6; and finally a brown terminal band, broadest in interspaces 2 and 3. Hindwing: basal half hyaline tinted with very pale mauve and slightly dusted with brown scales near costa

forming an indistinct band as far as lower edge of cell; outer half brown, traversed by a pale pellucid violet tinted band composed of lunules, rather pointed outwardly near costal end; an indistinct dark spot in interspace 2; and lastly a dark terminal waved line. *Underside*: pale silvery mauve; hyaline markings as on upperside; brown markings much paler and greatly reduced becoming obsolescent in the subterminal area; a black spot in interspace 2 of forewing and a similar spot in interspace 2 of hindwing centred with bluish white and encircled by a yellow and a pale brown ring; inner half of both wings defined by a narrow pale brown line commencing in interspace 6 of forewing and continued to dorsum of hindwing; a post discal; broad pale brown band, commencing in interspace 1 of forewing and continued to near tornus of hindwing; a subterminal area of the ground colour, broad on the hindwing, narrower on the forewing, where it merges into the postdiscal hyaline area; and finally a pale brown terminal line.

Female. *Upperside*: somewhat similar to the male but nearly entirely brown. Forewing: termen not so deeply excavated: a pale whitish narrow discal band composed of contiguous spots which are pellucid in interspaces 4—6; apical area of cell and interspaces 2 and 3, as far as the discal white band, darker brown; a pale subapical hyaline spot; an indistinct black spot in interspace 2; and a subterminal rather indistinct pale lunular band outwardly bordered with dark brown. Hindwing: a discal whitish band, dusted with brown and rather indistinct near dorsum, and pellucid in interspaces 6 and 7; a dark spot in interspace 2; a subterminal pale lunular band and a terminal dark band as in male. *Underside*: ground colour pale buff brown. Forewing: a white discal band as on upperside inwardly sharply defined and bordered by dark brown, outwardly somewhat diffuse; a preapical pale pellucid spot in interspace 6; ocellus in interspace 2 as in male; a diffuse pale brown patch in interspace 1 outwardly bordered with lilac; and lastly a terminal pale brown line. Hindwing: a white band as on upperside inwardly sharply defined and bordered with dark brown, outwardly diffuse and bordered by a rather broad pale brown band bearing an ocellus similar to the male in interspace 2 and some pale marks in interspaces 3—6; a broad subterminal area of the ground colour suffused with mauve near the tornus and apex; and lastly a terminal waved pale brown line. Eyes hairy.

Expanse: ♂ ♂ 2·78—3·2″; ♀ 3·1″.

Described from 15 ♂ ♂ and 1 ♀ taken at the foot of the hills near Sebong Manipur, on the Burma Road, in April. They were found by my Native collectors flying in a deep shady nullah. I sent the collectors back to the same place in May, but they did not see one again. The insect appears to be single brooded and is either very rare or extremely local.

It belongs to the subgenus *Eulaceura*, Moore, hitherto represented within Indian limits by a single species, *osteria*, Westwood.

Euripus funebris, Leech.

A single male was taken by my Native collector at Yakama, Naga Hills, at 5,000 ft. in July 1911, and three more at the same place, during the same month, in 1912.

Capt. Evans to whom I sent a figure for identification writes: "The *Memnon* like Nymphalid is *Euripus funebris*, Leech, described from Omeishan, very rare. Your figure and description agree exactly with Leech's figure, etc., in "Butterflies of China." A form of it has recently been described from Formosa in the *Entomologist*."

The butterfly is certainly very rare in the Naga Hills. I had collectors at Yakama all through July this year, especially to look for this insect but they failed to come across it.

ABROTA GANGA, Moore.

A single female was taken by Capt. Porter on the Dihang River, Abor Hills, in July, which differs from Bingham's description and figure and from Seitz's figure in having all the pale markings more suffused with dusky green, with the exception of the discal band on the hindwing which is almost white and very narrow.

SYMPHÆDRA DIRTEA, Fabr.

Three forms of *dirtea* occur in Manipur and one in the Naga Hills, *viz.* typical *dirtea*, Fabr. Occurs at Sebong, Eastern Manipur Hills, where several specimens were taken from March to July.

Var. *intermedia*, n. v. is an intermediate form connecting *dirtea* and *khasiana*. Many specimens were taken at Sebong, Eastern Manipur Hills, on the Irang River, Western Manipur Hills, and at Nichuguard, Naga Hills, from March to October.

Var. *khasiana*, Swinhoe: typical specimens were taken on the Irang River, Western Manipur Hills and near Sebong, Eastern Manipur Hills, in March and April, and again in October.

I do not think the difference in facies is due to seasonal causes as all three forms fly together on the Eastern Manipur Hills and varieties *intermedia* and *khasiana* fly together on the Cachar Road, Western Manipur Hills. In the Naga Hills var. *intermedia* only was met with.

DOPHLA DURGA SPLENDENS, sub.-sp. nov.

A single male taken near the foot of the Hills on the Ukral Road, about 28 miles east of Imphal, in July at about 3,000′ differs considerably from typical forms I have in my collection from Sikkim and the Abor Hills.

Upperside: white discal band on both wings broader; forewing otherwise similar.

Hindwing: the black margin to both edges of the white discal band broader and more distinct: the blue border beyond outer edge of discal band composed of a *complete series of well marked lunules* with the outer edge well *defined*; in typical *durga* from Sikkim and Assam this blue band is only formed into distinct lunules *near the costal end;* the tornal half always having the outer edge *even and rather diffuse*; terminal detached blue lunular streaks very distinct. *Underside:* basal ground colour purer blue and not so tinged with green; all the markings broader and more distinct; the subterminal area marked with large black lunules which are towards the apex of both wings very markedly outwardly pointed; terminal bluish white patches more prominent. Somewhat larger than typical forms before me.

Expanse: ♂ 4·52′.

This appears to be a very distint race of *D. durga*.

DOPHLA CURVIFASCIA, n. sp. (Pl. II, Fig. 13).

Male and female. *Upperside*: bronzy olive green somewhat similar to that of *D. nara*, but of a much more bronzy tint. Forewing: apex acute; termen nearly straight; cell with a medial and apical pair of short transverse black sinuous lines, the former extending into interspace 1 forming a circle and a black dot below; the space between the two pairs of dark lines paler than the ground colour; a postdiscal transverse band of spots as in *D. sahadeva* but much smaller; the spots in interspaces 2 and 3 sullied with the ground colour; a preapical pair of pale almost white spots in interspaces 6 and 8 below which is a pale yellowish green area, commencing in a point in interspace 5 and ending on the dorsum filling the outer half of interspace 1 and inwardly broadly bordered with dark blackish green; a

subterminal narrow dark band from costa to middle of interspace 2 and a similar terminal band broad at the apex and ending in a point at the tornus. Hindwing : a conspicuous curved pale yellow band commencing in interspace 7, broadening out in interspaces 6 and 5 and ending in a point in interspace 3, inwardly sharply defined and outwardly diffused ; a dusky black subterminal line, broadest at the costal end, between which and the discal yellow band the colour is much brighter than the basal half ; termen bordered with dusky black and separated from the subterminal dark band by a narrow band of the ground colour, except near the costa where it joins it. *Underside*: olive green ; the base of forewing and nearly the whole of the hindwing tinted with blue. Forewing : markings in cell as on upperside : a short streak below base of vein 2 ; a tranvserse series of white spots as on upperside, inwardly bordered with black ; preapical spots and subterminal dark line as on upperside, but the latter narrower and better defined and ending in a large dark purplish black spot in interspace 1 ; the middle of interspace 2 and outer two-thirds of interspace 1 dusky purple. Hindwing : a circular black mark at base of interspace 7 ; a short curved streak at base of interspace 6, another straight black mark at base of interspace 5 ; two narrow black lines across the cell and two more on either side of the discocellulars ; a curved discal band as on upperside but paler and narrower and continued into interspace 2 ; both edges defined sharply with olive green ; a subterminal olive green narrow line, sometimes forming detached linear spots in the male.

Antennæ black. Eyes dark brown. Palpi pale olive brown above, whitish below. Hanstellum pale green. Body dark bronzy green above, bluish grey below, somewhat darker in the male.

Expanse : ♂ ♂ 3·1—3·2″ ; ♀ ♀ 3·4—3·57″. Five males and three females of this rare butterfly were taken in August and September, during the past three years, at Yakama and Phesima in the Naga Hills at about 7,000′—8,000′ and a single male on Kabur Peak, Manipur, 8,400′ in August.

This very distinct species can be at once distinguished from its nearest allies *D. nara* and *D. sahadeva* by the conspicuous and continuous curved band on the hindwing.

Capt. Evans in vol. xxii. of the Journal, p. 282, mentions a *Dophla*, secured by Mr. Ollenbach in the Khasi Hills, as referable to this species. I have not seen the specimen he refers to but I doubt this being so ; the forewing of *D. curvifascia* is certainly very like that of *D. sahadeva*, but besides the spots being smaller, the spots in interspace 2 is very diffuse and not clearly defined as in *D. sahadeva*. The hindwing however is very different to *D. duda* ♀. The colour is bronzy green, whereas in *duda* ♀ it is very dark olive green ; the discal band in *duda* is white outwardly bordered with blue ; in *curvifascia* it is yellow and not bordered with blue and has the edge of the band on underside showing through. The band is moreover of a different shape being much hollowed out in the middle ; in *duda* it is only slightly curved.

Dophla sahadeva, Moore.

There are two well marked forms of the female which do not seem to intergrade :—

(*a*) A pale form with three spots on hindwing ; this is the prevailing form.

(*b*) A larger and darker form ; forewing rather more outwardly produced at apex ; spots more elongated and slightly tinged with very pale blue. Hindwing : *Upperside*: only *two* spots near costa. *Underside*: discal spots distinctly bluish ; the termen also is squarer at vein 4.

The two forms placed side by side appear very different but undoubtedly belong to the same species.

Dophla iva, Moore.

Three males and a female of this rare butterfly were taken by my Native collectors at Kirbari, Naga Hills, at 6,000 ft., in July, August and September.

Dophla taooana, Moore.

Two males in perfect condition taken on Cachar Road, Manipur, at the end of April or beginning of May.

This is a very interesting capture as it has previously not been recorded further north than the Hills of Lower Burma.

Euthalia cocytus, Fabr.

Several males taken at Sebong on the Burma Road, Manipur, in March, April, October and November. I believe this species has not been recorded so far north before.

Euthalia sedeva, Moore.

Both *E. sedeva* and *E. appiades* occur in Manipur but do not fly together. *E. sedeva* is confined to the *Western* Manipur Hills and *E. appiades* to the *Eastern* Manipur Hills.

E. adima was not met with.

Euthalia japroa, n. sp. (Pl. III, Fig. 22 ♂).

Male. *Upperside*: dark olive green. Forewing: Cell paler green than the ground colour and crossed by two dark broad bands; a subterminal row of white spots with diffused edges inwardly bent at interspace. Hindwing: a very indistinct broad discal band of slightly paler colour with iridescent greenish reflections somewhat brighter towards the tornus; a subterminal row of pale spots as on forewing but closer to the termen, large and white towards the apex, small and pale green towards the tornus; dorsum very pale green. *Underside*: bluish white with iridescent green reflections; two black broad bars crossing cell of forewing; a similar bar crossing cell of hindwing at its middle and a black spot near its base and another at the base of interspace 7; a very broad dark discal band, commencing in interspace 2 of forewing and continued to near tornus of hindwing where it ends in a point, purplish black on forewing and suffused with greenish reflections on the hindwing; its inner edge very dark and sharply defined in interspaces 4, 5, 6 and 7; inner edge below this and entire outer edge much paler and very diffuse; the subcostal area of forewing and subterminal area of hindwing suffused with iridescent green; a subterminal row of pale spots on both wings as on upperside but not so distinct becoming obsolescent towards the tornus; a terminal dark area narrow on the hindwing becoming broader towards the apex of the forewing.

Antennæ dark brown above and below; club below yellow brown.

Body dark green above; greyish bluish white below.

Expanse: 3·42″.

A very distinct species; its nearest ally appears to be *Euthalia franciæ* which, however, is quite different.

A single specimen was taken by my Native collector above Phesima, Naga Hills, at 6,000′ in a nullah below Japro Peak.

Bhagadatta austenia, Moore.

Only the wet-season form appears to have been described. The dry-season *female* differs from the wet-season *female* in being larger. *Upperside*: paler brown; post discal and subterminal bands much paler; subterminal lunules on forewing conspicuously whiter and on hindwing in one specimen outwardly bordered with white. *Underside*: ground colour paler; brown markings darker.

Two females obtained near the Lengha and Iraug Rivers, on the Cachar Road, Manipur, in April and May.

Many males and five females of the wet-season form were obtained at Kirbari, Naga Hills, at about 6,000′ from July to September. It is by no means a common butterfly.

Bhagadatta austenia purpurascens, sub-sp. nov.

Under the above name I propose separating the form of *austenia* which occurs in the Abor Hills, and which differs from Naga Hills specimens in having on the *upperside* of the males the ground colour strongly suffused with purple; and in having the subterminal lunules, in both sexes, from apex of forewing to interspace 3 much whiter and more distinct. *Underside*: the markings in both sexes are darker and stand out more clearly.

Female. *Upperside*: as in typical form. *Underside*: as in male.

The intensity of the purple suffusion is somewhat variable; five out of my eight specimens have it more marked than the other three. In the *typical* form this suffusion is only faintly discernible and sometimes absent; in no specimens before me is it nearly as intense as in any of the Abor Hills forms. Eight males and a female were taken by Captain Porter on the Dihang River, Abor Hills, at about 3,000′ in June and July and kindly presented by him to me.

Athyma larymna, Doubleday.

Five males and a female were taken near Sebong, Manipur, in March and July respectively.

This is an interesting capture, for although Westwood recorded it from Northern India, de Nicéville thought this to be probably incorrect and did not include it in his "Butterflies of India." Bingham gives its habitat as the Malayan Subregion, extending into Tenasserim.

Neptis nemorum phesimensis, sub.-sp. nov. (Pl. III, Fig. 24).

Very close to *N. nemorum*, Ch. Oberthur, but differs from the original figure in the "Études de Lèpidoptèrlogie comparèe," pl. viii, fig. 3, 1906, in having on the *underside* all the brown markings much darker with a purplish black tinge. Forewing with yellow markings very similar. Hindwing: the median yellow band much broader; the post median brown band also slightly broader and the terminal broad yellow area consequently narrower, which moreover is not bordered inwardly with dark brown as in the typical form. Interspaces 6 and 7 nearly entirely suffused with purple.

Expanse: ♂♂ 2·45—2·6″.

Eighteen males were taken by my Native collectors from the middle of May to the beginning of June, in a nullah near Yakama, Naga Hills, at about 6,000′.

Neptis kirbariensis, n. sp. (Pl. III, Fig. 19 ♂).

This may possibly be a race of *N. cydippe*, Leech, from Central and Western China, but from Seitz's figure of which it differs in the following respects:—

Upperside: yellow markings much paler and buffy yellow slightly darker near the edges. Forewing: preapical and post median spots much larger.

Hindwing : discal band much broader, narrow at dorsum broadening out at its middle. *Underside* : markings lighter. Forewing very similar but spots in interspaces 1-*a* and 1 large and joining on to spot in interspace 2 ; markings almost white with a pinkish tinge. Hindwing : discal band white with a pinkish tinge and much broader especially so towards costa, outer edge even and not broken at vein 6 ; the brown area below it confined towards the middle where it is outwardly produced as vein 4 crossing the white subterminal band ; subterminal band white and much more distinctly marked.

A single male was taken at Kirbari, Naga Hills, at 7,000′ at the end of June.

Expanse: ♂ 2 ·78″.

Neptis aspasia, Leech.

A single male of this species was taken by my Native collector at Kirbari, Naga Hills, at about 7,000′ in June.

It differs from Seitz's figure of *aspasia* on *upperside* forewing in having the preapical yellow spots larger and the dorsal spot also larger, the lower one being inwardly produced as far as the dip on angle in the dorsum. On the hindwing the median band is much broader; subterminal band paler and also slightly broader. On the *underside* the hindwing differs in having the subterminal pale violet band half as narrow ; vein 7 and base of veins 6 and 8 lined with violet.

N. aspasia is a Chinese insect and has not previously been recorded from within Indian limits although recently a single specimen has been recorded by South as having been taken by Captain Bailey at Rima in S. E. Tibet close to the Mishmi Hills border. (J. B. N. H. S., vol. xxii, page 357.)

Neptis antilope, Leech.

Two males and two females were obtained at Kirbari, Naga Hills, at about 7,000′, in June and July.

These specimens differ from Seitz's figures as follows :—

Upperside : spots in interspaces 2 and 3 of forewing larger and squarer as in *N. melba*, Evans ; in the figure they make one rather small round spot.

Underside : Forewing : preapical spots separate, the lower one white ; subterminal dark narrow line continuous, reaching the costa ; oblique dark brown band reaches right across the wing from the costa to the middle of the termen, in the figure it stops short of the subterminal dark line leaving the terminal area unmarked. Hindwing : discal band whitish, narrow at the dorsal end and broadening out towards the costa, in the *figure* of *antilope* it is the reverse, being widest at the dorsal end and narrowing towards the costa ; the dark post discal band is chocolate outwardly tinted with yellow with a violet band in its centre ; in the *figure* of *antilope* it is quite different. There is also a terminal dark line which is wanting in the figure. The Naga Hills form may prove to be a western *race* of *N. antilope*.

Neptis narayana nana, de N.

A single male taken at Kirbari, Naga Hills, 7,000′ in September. It agrees very well with a specimen in the de Nicéville collection.

Ab. naga, n. a single male of what appears to be an aberration of *nana* was taken at Kohima, Naga Hills, at 7,500′ in August. It differs from the typical form as follows : —*Upperside* : Forewing : all markings white except the preapical spots which are outwardly yellow. Hindwing : discal band white except near the costa where it is tinged with yellow ; cell streak on forewing broader. *Underside* : Hindwing : the double subterminal band broader and indistinct ; the terminal violet band also very indistinct.

NEPTIS NAMBA, n. sp. (Pl. III, Fig. 20 ♂).

Very near to *N. ananta* from the Naga Hills but differs constantly, in both sexes, in being much darker *above* and *below*.

Female. *Upperside*: all the markings conspicuously broader and darker than in ♀ *ananta* for the Naga Hills. *Underside*: darker, otherwise similar.

Expanse: ♂ ♂ 2·35—2·7″; ♀ 2·8.″

This form is readily distinguished from *N. ananta* by its much darker yellow bands on the upperside and by its richer brown red on the underside. It flies at the *foot of the Hills*; whereas *N. ananta* flies at a much higher altitude; in the rains *N. ananta* is found at 5,000—7,000 ft. and in the cold weather it descends to about 2,600 ft.

Many males and one female were taken by my Native collectors at Michuguard in the Naga Hills and on the Burma and Cachar Roads in Manipur from March to October. Two males were also received from Mr. Antram taken near Silchar. The seasonal forms do not appreciably differ.

In my notes on Naga Hills butterflies, J. B. N. H. S., vol. xxi, p. 61, I erroneously recorded this species as the wet-season form of *N. ananta*; it is, however, perfectly distinct.

RAHINDA PAONA, n. sp. (Pl. III, Fig. 23 ♂).

Male and female. *Upperside*:—black with rather pale yellow markings. Forewing: a yellow streak in cell broadening out at apex, almost reaching the base of vein 5 and bordered by that vein for some distance and ending in a point on vein 4; base of interspace 3 filled with yellow; a preapical row of contiguous spots in interspaces 5, 6, 8 and 9, the upper one minute and sometimes wanting; two subterminal yellow spots in interspaces 1 and 2, well separated from one another; the lower one small extending into interspace 1-a and reaching the dorsum; the upper one large extending across the interspace and just entering interspace 3. Hindwing: a broad yellow discal band from dorsum to vein 7; a narrow subterminal band of the same colour irrorated with fuscous scales, obsolescent towards costa. *Underside*: Forewing: dull black slightly tinged with brown red; yellow markings as on upperside but rather larger; costa at base, apical area and terminal area towards tornus yellowish; a subterminal chestnut line commencing at the costa well before the apex and ending at vein 1. Hindwing: costal interspace yellow at basal half; a broad antemedian yellowish green band streaked with chestnut and outwardly bordered with black towards the dorsum; a yellow discal band broadening out towards the costa; its outer edge broadly bordered with black; a broad postmedian greenish yellow band divided by a narrow chocolate line of detached streaks; a narrow pale yellow subterminal line violet towards the apex and outwardly bordered by a narrow dark chestnut line; a greenish yellow terminal band outwardly edged towards the apex by a narrow anteciliary purplish line.

Expanse: ♂ ♂ 1·82—1·88″; ♀ ♀ 1·97—2·22″.

Two males and two females were obtained by my Native collectors at Kirbari, Naga Hills, at about 7,000′ in June and July.

CHERSONESIA RAHRIA RAHRIOIDES, Moore.

A few males obtained at the foot of the Naga Hills, near Nichuguard, in October and November. A few males and a female obtained at Sebong, Manipur, in October and April, and a female on the Irang River, Cachar Road, Manipur, in February. The males taken in October show great variation in size and depth of colour. Bingham places this form as a race of *C. risa*, Doubleday, but I think there is no doubt that it is a perfectly distinct species.

Symbrenthia silana, de N.

Seven males and two females of the w. s. f. were obtained at Kirbari Naga Hills, at about 6000′ in July, August, September and October. Thirteen males of the d. s. f. were obtained near Sebong, Eastern Manipur Hills, and on the Irang River, Western Manipur Hills, at low elevations in February, March and April. This very distinct species can at once be distinguished from *S. niphanda* on the *upperside* by the much broader yellow markings and on the *underside* by (1) all the dark markings appearing very much darker; (2) the much broader band of the *ground colour* separating the subterminal cones from the terminal markings; (3) the very irregular anterior edge of the terminal lunules in interspaces 2 and 3.

S. silana is considered by some authors to be a race of *S. niphanda* and by others to be the d. s. f. of that species. I believe it is undoubtedly a good species. I have a single d. s. f. of *S. niphanda* taken at Phesima in the Naga Hills in April which only differs from the w. s. f. in having the cones on the underside of the hindwing half the size and the pale discal band rather broader.

The d. s. f. of *S. silana* only differs from the w. s. f. in being rather smaller and in having the rufous bands on the *upperside* if anything slightly broader. On the *underside* the green of the subterminal cones on the hindwing is carried on to the forewing, being distinct in interspaces 3 and 4, less so in 2, 5 and 6. On the *upperside* hindwing there is also sometimes a distinct fine reddish terminal line.

The type which is in the de Nicéville collection has the cones and lunules on the *underside* of the hindwing *metallic blue*, but it is aberrant in this respect, the remainder of the specimens in the collection and all my specimens have it very dark *bluish-green*.

Cirrhochroa aoris, Doubleday.

An hermaphrodite of this species was taken by Captain Porter on the Dihang River, Abor Hills, in June, and kindly presented by him to me.

The left pair of wings and left foreleg are male in character whilst the right pair of wings and right foreleg are female. I have not examined the genitalia very carefully but they appear to be male.

Calinaga aborica, n. sp. (Pl. III, Fig. 21 ♂).

Male. *Upperside* black with pale cream coloured markings. Forewing: two narrow pale streaks, irrorated with fuliginous scales, occupying basal half of the cell and joined together towards the base; the lower streak the longer of the two; two short contiguous similarly coloured streaks, placed one above the other, towards the end of the cell, between which and the bases of veins 3 and 5 are two more very indistinct pale spots; a broad pale streak, bifurcated at its outer half, in interspaces 1, commencing at the base and extending well beyond the base of vein 2, the lower portion the longer; a long narrow pale streak at base of interspace 4; a discal row of narrow pale streaks in interspaces 2—6; a subterminal row of pale cream spots in interspaces 1—6, interspace 1 having two spots; and lastly a terminal row of very indistinct spots in interspaces 1—4. Hindwing: a broad pale streak in cell, commencing at the base and not quite reaching the end, the outer two-thirds bifurcated and dusted with fuliginous scales, the upper portion a little longer than the lower; two pale streaks dusted with fuliginous scales at base of interspaces 4 and 5; a discal row of pale spots in interspaces 1—3 and 5—7, the first very small and indistinct, those in interspaces 5 and 6 long and linear; a subterminal row of large pale spots in interspaces 1—6; basal half of interspaces 1-*b* and 1-*a* pale cream; dorsal half of wing densely covered with

long grey hairs. *Underside*: pale markings as above but much broader and distinct: the subterminal row of pale spots on hindwing continued into interspace 1-*b*.

Body *above* black, sides of body at junction of the forewings red; *underneath* black, red near base of hindwings.

Antennæ black; eyes brown.

Expanse: ♂ ♂ 3·5—3·62″.

Two males were obtained by Captain Porter on the Dihang River, Abor Hills, in June and July, and kindly presented by him to me.

Its nearest ally appears to be *C. saka*, Moore, with the figure of which it agrees in having the white area in basal half of cell, forewing, divided by a black streak; but differs in the following respects:—

Upperside: much darker. Forewing: cell almost entirely black with only faint traces of white; discal spots smaller; base of interspace 1 pure cream colour. Hindwing: white area in cell very restricted and distinctly divided; the lower portion not as long as upper portion; all the markings smaller: interspaces 1-*a* and 1-*b* not entirely white, the outer halves being black. Thorax above black, the red hairs being confined to the sides of the body: the lower discocellular of cell of hindwing distinctly concave and not straight, ending at the junction of veins 3 and 4 and not above it.

It is quite different to *C. davidis*, from Western China, of which I have two specimens before me.

Family—NEMEOBIDÆ.

Dodona deodata longicaudata, de N.

A single female taken at Gaspani, Naga Hills, 1,500′ in October is very close to Bingham's figure of *longicaudata*, F. of B. I. Butterflies, vol. 1, p. 488, fig. 88, which is probably a wet-season form.

A male taken on the Cachar Road, Manipur, in December, and a female taken near the same place in November agree with deNicèville's type; a female taken with the above female has the white bands broader and agrees exactly with Elwes' figure of *D. deodata* from the Karen Hills; P.Z.S., 1891, Plate XXVII.

D. longicandata is certainly a race of if not typical *D. deodata* itself; specimens of the latter in the de Nicèville collection have the white bands, which are somewhat variable in width, rather broader than the dry-season form of *longicandata* and are probably extreme dry-season forms.

Taxila haquinus fasciata, Moore.

Occurs not uncommonly near Sebong at the foot of the Eastern Manipur Hills from February to April. A pair were also taken at the same place in October. I have taken this form at the foot of the Lushin Hills near the Cachar border.

Abisara attenuata, n. sp. (Pl. II, Fig. 15 ♂).

This may prove to be a race of *Abisara atlas* from Java. It differs from *atlas* in having the discal band *much narrower* and curved *inwards* at the costa, in *atlas* it curves *outwards* at the costa.

A single specimen was taken on the Barak River, Western Manipur Hills, in March.

Abisara echerius, Stoll.

Numerous males and three females, and which agree almost exactly with specimens in the Indian Museum ticketed *echerius* from *China*, were obtained near Sebong in October, November and January.

A. angulata, Moore, which occurs abundantly in the Manipur Valley is a very different looking insect and will prove to be a good species and not a race of *echerius*.

Family—PAPILIONIDÆ.

Papilio doubledayi cacharensis, Butler.

Not uncommon on the Barak and Irang Rivers in the Western Manipur Hills. Dry-season forms were taken from February to April and wet-season forms from July to October. *P. cacharensis* appears to have been described from the wet-season form; the dry-season form which has all the white markings much larger is almost identical with *P. doubledayi*.

Papilio kabrua, n. sp.

Very close to *P. polla*, de N. and *P. latreillei*, Don., from the former it differs in the following respects:—

Male. Forewing: proportionately broader, in this respect resembling *P. latreillei*. Hindwing: white spot in interspace 5 on both sides much smaller; cilia between tornus and apex of vein 3, at apex of tail and at apex of vein 5 black and not vermilion red, in this respect again resembling *P. latreillei*. The outer edges of the white spots on the hindwing almost straight and not deeply excavated as in *P. polla*.

Female. Forewing: similar in shape to that of *P. polla* ♀. White spots on hindwing as in male but outer edges even straighter: cilia black as in male.

From *P. latreillei* ♂ it differs on the hindwing in having an additional large white spot in interspace 5 and the spot in interspace 4 completely filling the base of that interspace. On the *upperside* there is no trace of a subterminal white spot in interspace 6: this spot is also generally wanting on the underside but is sometimes present.

Expanse: ♂ 4·64″; ♀♀ 4·5—5·36″.

A single male taken at Yakama, Naga Hills, at about 7,000 ft. in June and nine females taken in Manipur at 5,000—8,400 ft. in May and June.

Papilio polla, de N.

Two males taken at Saitu, Manipur, in May and a female at Poona, Naga Hills, at 8,000 ft. in June. Both this species and *P. kabrua* appear to be single brooded and are only on the wing in May and June.

Expanse: ♂♂ 5·28—5·7″; ♀ 5·36.″

Papilio crassipes, Oberthur.

Seven males and one female were obtained in the Western Manipur Hills at about 3,000 ft. in March and June and two males at the head of the Manipur valley at 3,300 ft. in July and September, also two males at Nichuguard, Naga Hills, in April.

Expanse: ♂♂ 4·46—4·94″; ♀ 5·2″.

Papilio alcinous impediens, Rothschild.

Many males and several females of a form of *P. alcinous* which agree fairly well in the Seitz's figure of *P. impediens*, Rothsch., were taken by my Native collectors near Kohima in the Naga Hills during May and the beginning of June at 7,000′; and three males in the Zulla Valley in June. Many of the specimens were unfortunately badly damaged and probably fresh specimens will be found flying at the beginning of May.

I am unable to say without comparison with the type whether the present form is typical *P. impediens* or is another *race* of the variable *P. alcinous*.

The male only differs from Seitz's figure of *impediens* in having only *one small* red spot at the tornal angle on upper hindwing instead of *four large* spots. The female is very pale brown with all the spots complete as in Seitz's figure of the male but larger and pink in colour. It is quite distinct from *P. pembertoni*, Moore.

Expanse : ♂ ♂ 4·22—4·98″ ; ♀ ♀ 5·3—5·6″.

Papilio slateri, Hewitson.

Occurs commonly at Nichuguard in the Naga Hills in March and April. Many males were taken on the Irang River, Western Manipur Hills, in March and a few in April. A few males and a female were also taken near Sebong on the Burma border in March. These latter specimens differ slightly from the forms taken on the Irang River and at Nichuguard in having on the underside of the hindwing a terminal and a subterminal row of linear spots, the latter well removed from the termen and quite separate from the terminal row. In the Irang River and Nichuguard specimens there is only a terminal row of spots sometimes very distinct and often completely absent.

Papilio paradoxus telearchus, Hewitson.

A single specimen of the rare ♀ mimicking the ♀ of *E. mulciber* and several ♂ ♂ were obtained on the Irang River, Western Manipur Hills, in March and May.

Papilio janaka, Moore.

Two males were taken by Captain Porter on the Dihang River, Abor Hills, and kindly presented by him to me. This is an interesting capture as it has not previously been recorded further east than Sikkim. Rothschild thought that this form and *P. bootes* would probably mix with one another in Bhutan, Nov. Zool. ii, 1895, p. 336. The Abor Hills form is however undoubtedly typical and so specimens from intermediate localities will also probably be typical.

Papilio mixta, n. sp.

Under this name I record a form closely allied to *P. bootes* and *P. janaka*. The male agrees with *P. janaka* in having four white discal spots on the hindwing and in the tornal red spot being conspicuous ; it agrees with *P. bootes* in lacking the subterminal series of red lunules in interspaces 3, 4 and 5, in one specimen there is a trace of a lunule in interspace 4, on the upper hindwing ; and on the underside in the basal red area not being continued along the dorsum of the hindwing. The female is like the male but has the discal white spots larger and has additional red lunules in interspaces 3 and 4.

Three males were taken at Yakama, Naga Hills, at about 6,000′ in May and two females on Kabru Peak, Manipur, 8,400′ in June.

Typical *P. janaka* occurs in the Eastern Himalayas from Sikkim to the Abor Hills. Typical *P. bootes* occurs in the Khasia Hills. *P. mixta*, Mihi, occurs in the Naga and Manipur Hills.

As far as is known these three forms do not intergrade in the above given localities. Typical *P. janaka* and typical *P. bootes* however are also said to occur and fly together in the Western Himalayas and are recorded by Mackinnon and de Nicèville from Tehri Garhwal "J. B. N. H. S., vol. xi, p. 593." Mr. Hannyngton records *P. janaka* from Loharkhet in Kumaon "J. B. N. H. S., vol. xx, p. 361," but does not mention whether it is *typical* or not.

A *third* form from the Western Himalayas was taken by myself at Loharjang in Western Garhwal, at 6,500′ in May, which does not agree with either typical *P. janaka*, *P. bootes*, or with *P. mixta*, Mihi, and which I propose naming *P. kala*.

P. KALA, n. sp.

Male. *Upperside* : on the hindwing there are three white discal spots in interspaces 2, 3 and 4, both above and below, and there is a subterminal series of red lunules in interspaces 1—4 as in *P. janaka* but smaller ; the tornal one does not coalesce with the admarginal one as it sometimes does in that species. *Underside* : the hindwing agrees with *P. bootes* in having the red basal area confined to the base and not produced along the dorsum as in *P. janaka*. It differs from both *P. janaka* and *P. bootes* in having the tail completely black and not spotted with pinkish white as in those two species resembling in this respect *P. bootes nigricans*, Rothsch.

P. janaka, *P. mixta*, mihi, and *P. kala*, mihi, will probably prove to be conspecific with *P. bootes*, which in the Eastern Himalayas, in the Khasia Hills, and in Manipur and the Naga Hills has developed into well marked and constant forms whilst in the Western Himalayas it is still inconstant and is represented by three distinct forms, *viz.*, typical *janaka*, *bootes* and *kala*, mihi.

PAPILIO KRISHNA, Moore.

A single male taken above Yakama, Naga Hills, in May. It is much rarer in these Hills than it is in Manipur. It appears to be single brooded.

PAPILIO ARISTEUS ANTICRATES, Doubl.

Several males of this form were taken in March at Sebong in the Eastern Manipur Hills and in the Kabor Valley, Burma, about fifteen miles from Sebong, flying with *P. aristeus hermocrates*, which was the prevailing form occurring somewhat commonly.

P. ARISTEUS HERMOCRATES, Felder.

A single male was taken at Nichuguard in the Naga Hills, in May, where the prevailing form *P. aristeus anticrates* occurs commonly in March and April.

LEPTOCIRCUS MEGES INDISTINCTA, Tytler.

Occurs rather rarely in the Manipur Hills. Several females which differ in no way from the males were obtained in the Naga Hills. This sex appears to be exceedingly rare.

TEINOPALPAS IMPERIALIS, Hope.

Occurs very commonly in the Manipur Hills at high elevations. A few females were taken on Kabru Peak from May to July. The spring females are somewhat smaller than those taken in the rains.

Family—PIERIDÆ.

PIERIS BRASSICÆ, L.

During the years 1911 and 1912 I only obtained a single male in Manipur ; but during the present year 1913 this butterfly simply swarmed in my garden from March to May ; the caterpillars doing great damage in the kitchen garden. The walls of my bungalow were favourite places for the caterpillars to pupate on and hundreds of pupæ could be seen hanging from them in sheltered spots.

(To be continued.)

THE PALMS OF BRITISH INDIA AND CEYLON. INDIGENOUS AND INTRODUCED

BY

E. Blatter, S.J.

Part XII.

(*With Plates LXIX—LXXIV.*)

(*Continued from page 281 of this Volume.*)

ACANTHOPHŒNIX, Wendl. in Fl. des Serres, t. 181.

(Etym.: From the Greek "acantha," a thorn or prickle, and "phœnix", a palm.)

Balf. f. in Baker, Fl. Maurit. 384; Mart. Hist. Nat. Palm, III, 174, t. 154, 155, fig. 1 (*Areca crinita*) et 176, t. 154, 155, fig. 2 (*A. rubra* excl. descript. et ic. fruct) Benth. and Hook. Gen. Pl. III, II, 898, 32.

Palms of moderate height, armed, caudex stout, anulate. Leaves terminal, equally pinnate, with complete, basal, spiny sheaths; midrib grooved on each side above attachment of the pinnæ; pinnæ strongly reduplicate, many-nerved, with scales and fine bristles on the undersurface; midvein with a few bristles on the upper surface.

Flowers monœcious in spirally disposed 3-flowered clusters, slightly immersed in the branches of a twice-branching slightly drooping spadix, the female flower below and between two males. Spathes two. Male flowers asymmetrical, trigonous-compressed. Sepals small, orbicular, carinate, imbricate. Petals obliquely ovate or ovate-lanceolate, acuminate, valvate. Stamens 6 or more, exserted, filaments free, elongate, cylindric, acute at the apex, incurved; anthers linear-oblong or globose, dorsifixed, versatile. Pistillode elongate-conical or 2-3-fid. Female flowers smaller, broadly ovate. Sepals ovate-orbicular, concave, broadly imbricate, petals as long as the sepals, orbicular, striate-nervose. Staminodes obscure. Ovary obovoid-oblong, straight or curved, 1-(or 2-3-) locular; stigma subapiculate, ovule parietal, pendulous.

Fruit small, globose or oblong, terete or compressed, stigmas lateral or subbasilar; mesocarp thin fibrous; endocarp subcrustaceous. Seed oblong, ascending, laterally slightly compressed; branches of the raphe spreading from the hilum, and anastomosing on the opposite side of the seed; albumen homogenous; embryo basilar.

Species.—About 4.

Distribution.—Mascarene Islands.

Fruit globose.. .....*A. rubra.*
Fruit oblong-cylindric.....*A. nobilis.*

ACANTHOPHŒNIX RUBRA, Wendl. in Fl. des Serres, XVI., 181; Baker Fl. Maurit and Seysh, 385.—*Areca rubra*, Bory Voy., I., 306; Willd. Spec., Pl. IV., 596, n. 9; Poir. Encycl. Suppl. I., 441, n. 10; Spreng. Syst. Veg., II., 139, n. 8; Mart. Hist. Nat. Palm, III., 180 (excl. descript fructus).—*Calamus verschaffeltia*, Hort.

NAME.—Palmiste rouge (French).

Rote Dornen-Areka (German).

DESCRIPTION.—Stem 60 feet high. Leaf 6-12 feet long; petiole glabrous, 2-4 inches long; leaf-sheath $2\frac{1}{2}$-$4\frac{1}{2}$ feet long, thickly covered with long brown-black spines; pinnæ slightly glaucous beneath. (Young plants have dark-green leaves with red veins).

Spadix $2\frac{1}{2}$-$3\frac{1}{2}$ feet long; peduncle 6-10 inches long, like the lower part of the branches armed with straight spines; branches stout, subtended by linear-lanceolate bracts; spathes $1\frac{1}{2}$-$2\frac{1}{2}$ feet long, with a few straight spines on the inside near the base. Perianth reddish-brown.

Fruit globose, $\frac{1}{3}$-$\frac{3}{8}$ inch in diameter, with a prominent ridge extending from the stigma to the base.

HABITAT.—Mauritius, rare, Bourbon. Cultivated in gardens.

CULTIVATION IN EUROPE.—A very elegant stove palm. It requires a light sandy soil and a temperature of 65°—80° in summer, and 55°— 65° in winter. Propagation is effected by seeds only, which germinate best in a moist bottom heat, and a well decomposed compost of one part loam, one of peat, one of leaf-mould, and the remainder of sand. They may be left in this soil for two or three years.

ACANTHOPHŒNIX NOBILIS, Benth. and Hook. f. in Gen. Pl. III, II, 398, 32—*Deckenia nobilis*, Wendl. in Gard.Chron., 1870, p. 561; Balf. f. in Baker Fl. Maurit.

NAMES.—French: Chou palmiste. German: Vornehme Dornen-Areka.

DESCRIPTION.—80-120 feet high, 10-14 inches in diameter. Leaves 9-14 feet long; petiole 1 foot long, pale green, smooth; sheath 3-6 feet long, usually spiny; leaflets hairy beneath, bristly on both surfaces when young; midrib yellow.

Spadix 2-6 feet long, shortly peduncled, slightly amplexicaul; branches very slender, pendulous; peduncle vertically compressed, much thickened at the base. Spathes 2, complete, seldom over 1 foot long, densely covered with flexuose yellow black-tipped spines.

Male flowers.—Perianth minute, the inner segments ovate, acute, valvate. Stamens 9, connate, equal in length to the inner segments; anthers globose. Pistillode and angular trifid column. Female flowers.—Segments of perianth imbricate. Stamens represented by a minute-toothed cup.

Fruit oblong-cylindric, $\frac{1}{2}$ inch long, $\frac{1}{6}$ inch thick, black. Stigma subbasilar; mesocarp fibrous; endocarp crustaceous. Seed erect;

raphe with 3-5 branches which ascend from the hilum and then spread over the surface ; albumen homogeneous ; embryo erect, basilar.

Habitat.—Seychelles.

Gardening.—*Acanthophœnix nobilis* is an elegant spiny palm with pinnated leaves and linear pointed leaflets, which are gracefully drooping at the point. There is an illustration of this palm in Gard. Chron., 1870, p. 561. The palm had first been called Deckenia by Wendland in honour of Baron von der Decken, the African explorer. It should not be confounded with Deckeria, a synonym of the American genus Iriartea.

Illustrations.—We reproduce on plate LXIX a group of *Verschaffeltia splendida*, Wendl., growing in the Botanic Gardens of Singapore. Mrs. Burkill was kind enough to take the photographs. The description of this species appeared in our last issue.

Plate LXX shows a fine specimen of *Acanthophœnix nobilis*, Benth. and Hook., photographed in a jungle of the Seychelles Islands.

ONCOSPERMA, Bl. in Rumph., t. 82, 103.

(Etym. : From the Greek " oncos," a tumour, and " sperma," seed, alluding to the shape of the seed.)

Mart. Hist. Nat. Palm. III, 112, t. 150, 153, f. 4, 5 (*Areca horrida*). Meissn. Gen. Pl. 355, Comm. 266 (*Keppleria*).—Griffith Palms Brit. Ind. 157, t. 233 B. C. (*Areca*, sect, *Euoplus*).—Scheff. Ann. Jard. Bot. Buitenz., I, 139, 159, t. 29, f. 3 et t. 30.—Benth. and Hook., Gen. Pl. III, II, 895, 28.—Linnæa 39, 186.—Hook., Fl. Brit. Ind., V1, 414.

Trunk tall, prickly, stoloniferous. Leaves terminal, equally pinnatisect, segments equidistant or sub-fasciculate, ensiform, acuminate, entire at the apex ; rhachis furfuraceous ; sheath elongate.

Spadix short-pedunculate, simply or twice branched, unarmed or aculeate ; spathes 2, complete, as long as the spadices, caducous, ensiform, coriaceous, unarmed, or aculeate, the inner one bicristate. Flowers sessile, spirally crowded on the branches, the upper solitary, male, the lower ternate, a female between two males. Male flowers asymmetrical, trigonous compressed. Sepals small triangular-rotundate, acute, imbricate at the base. Petals obliquely ovate, acute or acuminate, valvate. Stamens 6-12 ; filaments short, straight or incurved at the apex ; anthers linear, erect. Pistillode columnar, split at the apex. Female flowers much smaller than the male, obliquely globose. Sepals unequal, rotundate, gibbous at the base, broadly imbricate. Petals slightly longer, orbicular, convolute-imbricate. Staminodes minute, 6. Ovary broadly and obliquely ovoid, 1 or 3-locular, stigmas minute ; ovule parietal, pendulous.

Fruit small, globose ; stigmas lateral or subbasal ; pericarp rumose or subfibrous, endocarp thinly crustaceous. Seed globose or subglobose ; raphe broad ; albumen deeply ruminate ; embryo near the hilum.

SPECIES.—About 6.

DISTRIBUTION.—Tropical Asia.

CULTIVATION IN EUROPE.—Stove Palms. They grow best in a compost of two parts loam, one of peat, and one of sand. A liberal supply of water is required. Propagation is effected by seeds or suckers.

ONCOSPERMA FASCICULATUM Thw. Enum. 328 (1864). Hook, Fl. Brit. Ind., VI., 415. Trimen, Fl. Ceylon, IV, 323 ; Scheff. in Ann. fard. Buitenz., I, 160.—*Caryota horrida*, Moon, Cat. 64 (non Willd.).

NAME.—Katu-Kitul (Ceylon).

DESCRIPTION.—Trunk 30-50 feet high, 5-6 inches in diameter, copiously armed with long, flexible, black, compressed spine, base thickened, stoloniferous. Leaves 8 feet long; leaflets 12-18 inches long, 1-1¾ inch broad, fascicled, lanceolate, caudateacuminate, tips drooping, scurfy beneath ; rhachis scurfy ; petiole spinous towards the base, sheath 2½ feet, spinous, scurfy.

Spathes sparingly scurfy, unarmed, inner 2-crested. Spadix 2 feet long, unarmed, paniculately branched ; peduncle very stout, branches drooping. Male flowers ¼ inch long, densely imbricate ; sepals very small ; petals acute, striate ; stamens 9 ; filaments short, broad, fleshy ; anthers linear. Female flowers scattered, ⅙ inch in diameter. Sepals thick, forming a broadly 3-lobed cup ; petals hardly longer than the sepals, coriaceous, broader than long.

Fruit globose, ½ inch in diameter, black or purple, like large black currants.

HABITAT.—Ceylon. Steep forests in moist region, 1-5,000 feet ; rather common. (Endemic in Ceylon.)

Flowers in February and March.

ONCOSPERMA HORRIDUM, Scheff. in Natunrk. Fijdsch. Ned. Ind., XXXII, 189 ; Ann., fard. Buitenz, I, 159. *Areca horrida*, Griff. in Calc. Fowm. Nat. Hist., V, 465. Palms Brit. Ind. 158—233C ; Mart., Hist. Nat. Palm, III., 312. Hook., Fl. Brit. Ind., VI., 515. *Areca nibung*, Mart., Hist. Nat. Palm, 173, t. 150, f. 4.

NAME.—Bhyass (Malay Peninsula) ; Bijass-Palme (German).

DESCRIPTION.—Trunk 30-40 feet high, sending off stolons at the base, annulate ; spaces between the rings much armed. Crown rather thin. Leaves 14-16 feet long, 5 feet broad, spreading in every direction. Sheaths leathery, 2 feet long, much armed. Petiole bearing leaflets nearly from the base, green, stout, flattened at the base, compressed at the apex, otherwise trigonal, covered with brown irregular scales, armed throughout, but specially underneath, with black-brown flat not very strong spines. Pinnules 2-3 feet long,

alternate or subopposite, very narrow, subulate-acuminate, coriaceous, dark-green, above keeled along the centre, with 2 lateral plaits on either side, spreading or oblique; a few scales attached by the middle extend along the central vein underneath.

Spathes 2 complete, acutely margined, coriaceous, armed with brown-black spines, outer 1-1½ feet long, of a greenish colour outside when mature, yellow and polished inside, inner cuspidate. Spadix axillary; peduncles stout, yellow, flattened at the base, much armed on the spaces between the insertion of the spathes, above these unarmed; branches 1-2 feet long; pendulous, flexnous, about equal, 2 or 3 times branched or simple. Male flowers: sepals 3, imbricate, carinate, submembranous; petals 3, valvate, subulate or almost setaceo-acuminate; stamens 6, sagittate; pistillode rather large of 3, sometimes 2, imperfect carpels. Female flowers: sepals imbricate, roundish-cordate; corolla conical in the bud; staminodes 6; ovary of 1 large complete carpel and 2 incomplete ones; no style; ovule anatropous, parietal.

Fruiting spadix: branches 2-4 feet long, pendulous, without spathes, each suffulted by a coriaceous acuminate broad-based bract; fruit sessile, spherical, ¾-1 inch in diameter, purplish-black, surrounded at the base by the perionth, oblique, the true apex being indicated by a mammilla on one side near the middle; epicarp coriaceous; fibres very few, endocarp membranous, seed round, attached by a broad base, whitish-brown, reticulate with white veins, hilum large; albumen horny, deeply ruminate.

HABITAT.—Malacca; common in densely wooded valleys and ravines, at Ching, and on wooded hills, at Laydang Soobubi, but rare; in woods at the base of Battoo Bakar; Borneo (Griffith); Sumatra.

NOTE—This species is very nearly allied to the species, *O. filamentosum*, and seems to differ from it only by its larger fruit which reaches up to one inch in diameter.

ONCOSPERMA FILAMENTOSUM, Bl., Rumphia, II., 97, t. 82, 103; Hook., f. Fl. Brit. Ind., VI, 414.—*O. cambodianum*, Hance. in Journ. Bot. (1876) 261.—*Areca tigillaria*, Jack., in Mal. Misc., II, VII, 88; Griff., in Calc. Journ. Nat. Hist., V., 463, et in Palms Brit. Ind., 157, t. 233 B.—*A. nibung*, Mart., Hist. Nat. Palm, III, 173, 311, t. 153.—*Areca nibung*, Griff., ex. H. Wend, 1. in Kerch. Palm, 231. *Keppleria tigillaria*, Meissn. Gen. (1842) 355.—*Oncosperma tigillaria*, Ridley, Fl. Singapore in Journ. Asiat. Soc. Straits, S. No. 33 (1900) 173.—*Areca spinose*, Hort.

NAMES—English: Nibung Palm.
German: Nibungpalme.
Jav.: Erang, Handiwung, Liwung, Gendiwung.
Malay.: Nibong. According to Ridley, the natives of the Malayan Peninsula distinguish several formes under the names of Lenau, Ibas or Ibu and Nibong Padi.

DESCRIPTION.—Stem 30-80 feet high, distinctly annulate, armed with long black spines, stoloniferous. Crown thick, graceful. Leaves pinnate, 10-12 feet long, drooping; petiole roundish, armed, very scurfy upwards; leaflets about 2 feet long, conduplicate at the base, acuminate, pendulous, coriaceous, many veined, principal keel above excentric, ferruginous scurfy, underneath bearing scales attached by their middle.

Spathes boat-shaped, two-keeled, of a stout texture, outer green, covered here and there with whitish-ferruginous scurf, armed on the back especially about the keels; inner almost unarmed, more scurfy, velvety. Spadices arising from the axils of fallen leaves; peduncle slightly armed; branches many, long, undulato-flexuous, lower ones divided, upper simple. A rudimentary bract at the base of the lower one. Flowers crowded, one female between two males, or in pairs, one male and one female, the former more advanced. Male flowers: sepals subeordate, cuspidate, keeled; petals 3, valvate, coriaceous, suddenly acuminate into subulate bristles, spreading; stamens 6, filaments short, stout, cohering slightly with the petals, anthers large, sagittate, obtuse; pistillode rather large, white, of 3 carpels which are distinct nearly from the base. Female flowers with a broad incospicuous bract; sepals imbricate, suborbicular, concave, fleshy, coriaceous; petals larger, imbricate; staminodes 3 or none; ovary roundish, of the size of a small pea, 1-celled; style none. stigmas 3, connivent; ovule appense pendulous.

Fruiting spadix: branches 1-2 feet long, pendulous, purplish-sanguineous, with an articulated appearance; berry spherical, $\frac{+}{10}$ inch in diameter, surrounded at the base by the perianth, marked towards the apex on one side with an areola, bearing in the centre the remains of the stigmas; endocarp fibrous, thin; seed appense just below the areola; albumen horny, deeply ruminate; embryo oblong-conical, basilar.

HABITAT.—Singapore; common, Tanglin, Changi; Johor; Malacca; Pringgit and near the town; Cochin China; Borneo. Cultivated in India.

USES.—"The wood of the nibong is used for many purposes, in building for flooring, bridges and such like, also for pig spears. Sharpened spears of it are driven into the ground in lalang at such an angle that the point is about the level of the breast of the pig. The spears are pointed towards the garden to be protected from the wild pigs and quite concealed in the grass; when the pigs invade the garden the natives startle them by shouts and other noises, the pigs rush out and are impaled on the spears." (Ridley.)

ILLUSTRATION.—Mr. Macmillan has kindly supplied us with the photograph reproduced on Plate LXXI. The left-hand groups consists of *O. fasciculatum* and the one to the right of *O. filamentosum*.

HYDRIASTELE, Wendl. and Drude in Linnæa, XXXIX, 180, 190, 208.

(Etym. : From the Greek "hydria" a water vessel or fountain, and "stele", a column, in allusion to the tall stems growing near springs).

Benth. Fl. Austral, VII, 138—F. Muell. Frag. Phytogr. Austral., VII, 101, 102.—Benth. and Hook., Gen. Pl. III, II, 885,5.—Bailey Annusl. Fl., V, 1673.

Stem straight, high, slender, unarmed, annulate. Leaves terminal, pinnatisect, segments alternate, linear, præmorse-dentate at the apex; rhachis laterally compressed, convex on the back; petiole concave. Spadices shortly and broadly pedunculate, simply branched, branches elongate pendulous, obtusely quadrate; spathes 2, complete, deciduous; bracts and bracteoles forming an obscure cupule. Flowers monœcious, pale yellow or greenish, disposed in decussately opposite areolæ. three together, the central one female; bracts and bracteoles obsolete. Male flowers asymmetrical, compressed. Sepals minute, acute, scarcely imbricate. Petals ovate-lanceolate, acuminate, valvate. Stamens 6, filaments short, subulate; anthers linear, erect, basifixed. Female flowers much smaller than the male, subglobose. Sepals reniform, imbricate. Petals slightly longer, orbicular, convolute-imbricate. Staminodes obsolete. Ovary globose or ovoid; 1-locular; stigmas 3, minute, sessile patulate depressed; ovule inserted above the middle of the cell, pendulous.

Drupe small, elliptic, smooth or ribbed; stigmas terminal; pericarp fibrous; endocarp thinly crustaceous. Seed ellipsoidal, erect, free, hilum lateral; albumen equable; embryo basilar.

Species—3.

Distribution.—Tropical northern coast of Australia.

HYDRIASTELE WENDLANDIANA, Wendl. and Drude in Linnæa, XXXIX., 209; Bailey Queens Fl., V., 1673.—*Kentia Wendlandiana*, F. Muell, Fragm., VII, 102; Benth Fl. Austr., VII., 138.

Name.—Wendlands Nymphen-Palme (German).

Description.—A tall palm. Leaves many feet long, segments numerous, unequal, the longest 1½ foot long, the upper ones confluent at the base, all or most of them jagged or toothed at the apex.

Spadix of numerous slender pendulous spikes of about 1 foot, the common peduncle very short, broad and thick, marked with the scars of the spathe and of two outer bracts, the primary branches very thick, the rhachis of the spikes slender, the notches very little immersed. Female perianth (fruiting) about 2 lines in diameter; the segments all very broad, the inner twice as long as the outer ones.

Fruit ovoid or globular, when dry about 4 lines in diameter and longitudinally striate with prominent ribs, succulent when fresh with a thin endocarp. Seed erect, with an oblong oblique basal hilum, the testa free from the endocarp, the albumen not ruminate.

HABITAT.—N. Australia: Liverpool River, Queensland, Cape York, Cape Sidmouth.

CULTIVATION IN EUROPE.—A stove palm. It grows in a compost of loam and peat, in equal proportions; a little silver sand may be added. They need plenty of pot room, and a liberal supply of water throughout the summer, both at the roots and overhead. The imported seeds germinate quickly in a light sandy soil, if placed on a hotbed, young plants grown from seeds do well in the drawing room. The first leaves are deeply bifid and show already the præmorse-dentate tips.

ILLUSTRATION.—We have to thank Mr. Phipson for the photograph of *Hydriastele Wendlandiana*, reproduced on Plate LXXII. The specimen may still be seen in Victoria Gardens, Bombay.

RHOPALOSTYLIS, H. Wendl. and Drud in Linnæa, XXXIX, 180, t. 1, f. 2.

(Etym.: From "rhopalon", a club, and "stylos," a pillar; alluding to the club-shaped spadix.)

Mart. Hist. Nat. Palm, III, 172, t. 151, 152 (*Areca*) et 312 *Kentia sapida*).—Hook f. Fl. Nov. Zel. I, t. 59, 60, (*Areca*).—Drude Bot. Zeitg., 1877, 637, t. 6, f. 18-21". Bot. Mag., t. 5139, 5735 (*Areca*).—Benth. and Hook., Gen. Pl. III, II, 890, 16.

Unarmed low palms, stem annulate. Leaves terminal, equally pinnatisect; segments numerous, equidistant, narrowly ensiform, acuminate, margins at the base recurved, not thickened; rhachis on the concave side furfuraceous; petiole very short; sheath elongate.

Spadices short, patent, with a very short and stout peduncle; branches subflabellate, dense-flowered; spathes 2, complete, oblong, complanate, the lower one 2-winged; bracts subulate at the apex; bracteoles squamiform. Flowers monœcious on the same infrafoliaceous or iastigiately branched spadix, spirally disposed, ternate with the median one female, or the upper ones solitary and 2-nate male, with bracts and bracteoles. Male flowers asymmetrical, trigonous-compressed. Sepals subulate-lanceolate, scarcely imbricate. Petals obliquely ovate, acuminate, valvate. Stamens 6, filaments subulate filiform, inflexed at the apex; anthers linear, dorsifixed, versatile. Pistillode columnar. Female flowers smaller than the male, trigonous-globose. Sepals rotundate, concave, broadly imbricate. Petals smaller scarcely exserted, cochleate at the base, broadly imbricate, suddenly narrowed into triangular valvate tips. Staminodes obsolete. Ovary ovoid, 1-locular; stigma sessile, 3-fid, the trigonous segments erect; ovule parietal.

Fruit ellipsoidal, smooth, umbonate by the terminal stigma; pericarp fibrous; seed ovoid-oblong or ellipsoidal, erect, free, the broad hilum reaching from the base to the apex; albumen equable; embryo basilar.

SPECIES—2.

DISTRIBUTION.—New Zealand, Norfolk Island.

Flowers purplish lilac, drupe oblong...	...	*R. sapida.*
Flowers white, drupe globose	...	...	*R. baueri.*

RHOPALOSTYLIS SAPIDA, H. Wendl. and Drude in Kerch. Palm, 255; Cheesma New Zeal. Fl., 740.—*Kentia savida*, Mart., Hist. Nat. Palm. III, 312; Drude, Palmæ in Nat. Pflanzenf., II., 3, 73.—*Areca sapida*, Soland, ex Forst. Plant, escul, 66; Ferd., Bauer Illustr. plant, Norfolk, t. 179, 180, 202, 203, in Museo Caes. Vindobon asservatæ; Mart., Hist. Nat. Palm, III, 172, t. 151, 152; A. Rich. Fl. Nouv. Zel., 157; *A. Cunn.*, Precur. n. 298; Raoul, Choix, 40; Hook., f. Fl. Nov. Zel., I, 262, t. 59, 60. Handb., N. Z. Fl., 288; Bot. Mag., t. 5139. *Areca banksii*, Allan Cunn. MS.

NAME.—Nikan Palm (English); Schmackhafte Nikan Palme (German).

DESCRIPTION.—Stem rather slender, smooth, 10-25 feet high, 6-9 inches in diameter, rarely more. Leaves 4-8 feet long; rhachis clothed with copious lepidote scales; leaflets very numerous, 2-3 feet long or more, 1-2 inches broad, linear-ensiform; midrib and main veins covered with lepidote scales; margins replicate at the base.

Spadix 1-2 feet long, much and closely branched, glabrous; spathes 2 or 3. Flowers very densely crowded, purplish-lilac. Drupe $\frac{1}{2}$ inch long, elliptic-oblong, bright-red.

HABITAT.—New Zealand. North Island, abundant in forests throughout; South Island, in low land districts not far from the coast as far south as Banks Pennisula and Hokitika, rare and local; Chatham Islands sea-level to 2,000 feet. (The Nikau-palm is the most southern member of its order).

FLOWERS.—From January to April.

USES.—The unexpanded central bud and the very young spadix are both edible, and were formerly eaten by the Maoris, and even by European settlers.

RHOPALOSTYLIS BAUERI, H. Wendl. and Drude in Bot. Zeitg., XXXV (1877) 638; Cheesem, New Zeal. Fl., 740.—*Kentia baueri*, Seem., Fl. Vit., 269; Cheesem., in Trans. N. Z. Inst., XX (1888), 174.—*Areca baueri*, Hook. f. in Illustr. Hist., XV. (1868), 575; Bot. Mag., t. 5735.—*Areca sapida*, Endl. Prodr. Fl. Norfolkicæ 26 (not of Soland)—*Seaforthia robusta*, Rollis (accord. to Salomon, Die Palmen).

NAME.—Norfolk Betel Palm (English); Bauers Nikau Palme (German).

DESCRIPTION.—Larger and stouter than the foregoing species, sometimes attaining a height of 50 feet and a diameter of over 12 inches. Leaves larger and more numerous, 6-9 feet long, pinnate; rhachis beneath, costa and nerves at back of the pinuls sparingly clothed with furfuraceous scales. Pinnales close-set, two feet long, $1\frac{1}{2}$ inch broad, stiff, acuminate, usually 3-nerved, ribbed and plaited; rhachis triangular towards the base, convex above.

Spathes 8-10 inches long, white, narrow-oblong, acuminate, flat at the back, 3-4 inches across. Spadix axillary, but, owing to the falling away of the leaf as soon as the spathe is ready to open and the flowers are fully formed, only flowering when infra-axillary, horizontally patent from the stem, 1-3 feet long, sparingly branched; branches stout, devaricating, white in flower, green in fruit. Flowers crowded, white, nearly $\frac{1}{2}$ inch when expanded. Outer perianth-segment broadly ovate in the female, narrower in the male, inner oblong, acute.

Drupe nearly globose, $\frac{1}{2}$-$\frac{3}{4}$ inch in diameter, scarlet, shining.

HABITAT.—Kermadec Islands: Sunday Island, abundant from sea-level to the tops of the hills (1,500 feet). Originally discovered in Norfolk Island.

CULTIVATION IN EUROPE.—This and the foregoing species are ornamental stove-palms. They thrive well in a compost of loam and peat, in equal proportions, to which a little silver sand may be added. Plenty of pot room, and a liberal supply of water, both at the roots and overhead, are essential. The seeds germinate quickly in a light sandy soil, when placed on a hotbed. These palms are liable to be attacked by Red Spider or Thrips; in that case the plants must be sponged with soapy water.

Dammer says that *R. baueri* and *R. sapida* are hardy drawing-room palms which are best kept cool in winter. *R. baueri* sometimes stands several degrees of frost on the Riviera. In its original home *R. sapida* is, for some time of the year, exposed to frost and snow without taking harm. Salomon has observed that in winter this palm thrives much better at 42-46° F. than in a higher or lower temperature. Care should be taken, however, not to place the palm too far away from the light. In summer the plant will do well in the open garden.

To distinguish *R. baueri* from *R. sapida* the following points of difference should be noted:—

R. baueri.	*R. sapida.*
Greater height and longer leaves.	
Leaflets of the regularly pinnate leaves more horizontal and, compared with their length, broader than those of *R. sapida.*	Leaflets more erect and comparatively narrower.
	Leaves more reflexed at the top than in *R. baueri.*
Flowers white.	Flowers purplish-lilac.
Fruits scarlet and more spherical.	Fruits bright red, elliptic-oblong.

CYRTOSTACHYS, Bl. Rumph., II., 101, t. 120.

(From the Greek "cyrtos," curved, bent, and "stachys," a spike; in allusion to the curved spikes of flowers).

Mart., Hist. Nat. Palm., 316.—Kunth Enum., Pl. III, 641. *Bentinckia*.—Walp. Ann., III, 647.—Mig. Fl. Ind. Bot. Suppl., 589 (*Areca erythropada*).—Scheff. Ann. Jard. Bot. Buitenz., 138, 159—Benth. & Hook., Gen. Pl. III, II, 892, 20.

Stems slender, caespitose, annulate. Leaves pinnatisect; leaflets linear-lanceolate, acuminate, unicostate.

Spathes 2, complete, caducous. Spadix intrafoliar, shortly peduncled, broadly paniculately branched; branches 1-2 feet long, stout, spreading; flowers in spirally disposed clusters of 3, a female between 2 males.

Male flowers symmetrical; sepals orbicular, imbricate; petals valvate; stamens 12-15, exserted; anthers short, versatile; pistillode bifid. Female flowers: sepals orbicular; petals longer, broadly imbricate, tips valvate; staminodes forming a membranous cup; ovary narrowly ovoid; stigmas subulate ovule; pendulous from the tip of the cell.

Fruit small, ovoid; stigma terminal. Seed adherent to the endocarb, globose hilum apical; albumen equable; embryo basilar.

Species.—About 3.

Distribution.—Malayan.

CYRTOSTACHYS LAKKA, Becc., Ann. Jard. Buitenz. II, 141; Hook., Fl. Brit. Ind., VI, 414, *C. Lakka*, var. *singaporensis*, Becc. l. c.

Ridley Mat. Fl. Malay. Penin. 11, 149.

Names.—English: Sealing wax Palm.
German: Gruben Rendapalme.
Malayan: Pinang Rajah.

Description.—A slender tall soboliferous palm; stem 12-15 feet high, 3 inches in diameter, olive-green, smooth except for the node, internodes 6 inches long. Leaves 4-5 feet long, erect, pinnate; petiole 6 inches long, red; sheath 2 feet long, red; leaflets linear with long points, about 25 pairs, dark-green above, glaucous beneath, 18 inches long, 1½ inch wide; rhachis red.

Spadix long, deflexed, green, finally red, with about 25 branches. Spathes broad oblong, curved. Flowers spirally arranged, 1 female between 2 males. Male flowers: Sepals ovate, green edged red; petals longer, ovate, green stamens 11 (12 or 15); filaments slender, bases adnate to the pistillode, longer than the petals, white; anthers small, oblong; pistillode thick; styles 3, base thickened and narrowed upwards, shorter than the stamens. Female flowers: Sepals broadly rounded; petals ovate, much larger, green; ovary globose; stigmas short, thick, recurved, brown.

Drupe small, obovoid, $\frac{2}{5}$ inch long by about $\frac{1}{3}$ inch in diameter, black, base scarlet; pulp thin. Seed ovoid, $\frac{1}{4}$ inch long; albumen equable; embryo basilar.

HABITAT.—Singapore: Kranji, Jurong; Pahang: near Pekan; Selangor: Klang; Perak: Teluk Anson (ex Ridley); Borneo.

Cultivated in India.

NOTE.—*C. lakka* is very near the next species, *C. renda*, which has an ovoid fruit abruptly constricted and a globose seed.

CYRTOSTACHYS RENDAH, Bl. Rumph II, 101, t. 120; Kth. Enum. Pl. III, 641. Sheff. in Ann. Jard. Bot. Buit. I, 126, 159; H. Wendl, in Kerch. Palm, 242; List of Palms in Kew Rep., 1882 (1884), 55.—*Bentinckia renda*, Mart., Hist. Nat. Palm, III, 316; Miguel, Fl. Ind. Bat., III, 42 et Prodr. Fl. Sum, 254; Walp. Ann., III, 467, V., 812.—*Areca erythropoda*, Mig. in Joun. vot. neerl. 1, p. 6, et Prodr. Fl. Sum. 253, et 589.—*Ptychosderma coccinea*, Hort. Lugd. Bat., Cat. pl. hort. bot. Bog. (1866) 69; Mig. De Palm, 24.—*Pinanga purpurea*, Hort. Bog. in Mig. Prodr. Fl. Sum. 590.

NAMES.—Pinang rimbou, Pinang rendah or rende, Pinang Lempianw (Sumatra); Sealing-wax Palm (English); Rotstammige Renda-Palme (German).

DESCRIPTION.—A gregarious palm. Stem above 30 feet high, graceful, smooth, annulate. Leaves 6-6 feet long (excluding the leaf-sheath) decrescent-pinnatisect; petiole about 6 inches long. Segments narrow lanceolate, the longer ones 28 inches long, 2 inches broad, acuminate; the terminal segments shorter, bidentate or shortly bifid, or subobtuse.

Spathes: 2 complete, 2 incomplete. Flowers crowded, 1 female between 2 males. Stamens 12-15. Ovary unilocular, 1-ovuled, sometimes the rudiments of a second or third loculus are found; ovule pendulous from the tip of the cell; stigmas subulate.

Fruit ovoid, at the apex abruptly apiculate, 2/5 inch long, $\frac{1}{4}$ inch broad. Seed round, about 1/5 inch in diameter, adherent to the endocarp; hilum apical; albumen equable; embryo basilar.

HABITAT.—Sumatra.

CULTIVATION IN EUROPE.—This and the foregoing species are stove-palms. They grow in a compost of loam, peat, and leaf soil, in equal parts, with a liberal addition of sand. When they are fully grown, they prefer about two-thirds of loam and some rotten cow-manure. The seeds germinate in a compost similar to the one mentioned, when they are placed in a moist gentle heat.

ILLUSTRATION.—Plate LXXIII shows a fine tuft of Sealing-wax palms (*Cyrtostachys rendah*) in the Botanic Gardens of Peradeniya. The photograph was taken by Mr. Macmillan.

PTYCHOSPERMA, Labill. in Mem. Inst. Paris, 1808, IX, 253.

(Etym.: From the Greek "ptyche," a fold or winding, and "sperma," seed; alluding to the ruminated albumen.)

R. Br. Prod. 267 (*Seaforthia*).—Mart. Hist. Nat. Palm, III, 182, t. 128, 129.—Benth. Fl. Austr., VII, 141 (*Ptychosperma*, sp. n. 4)—Seem. Fl. Vit., 272, t. 82.—Scheff. Ann. Jard. Buitenz. I, 120, 135, 154—Wendl. and Drude in Linn. XXXIX, 183, 215.—Becc. Males, 1, 47, 99 (excl. sp.).—Benth. and Hook., Gen. Pl. III, II, 891, 18.

Stem erect, slender, high, unarmed. Leaves terminal, equally pinnatisect; segments linear or from the base towards the apex dilate, præmorse membranous, many-nerved, thickened on the margin, recurved at the base, the terminal ones confluent; rhachis trigonous, thin; sheath elongate.

Spadix paniculately branched; spathes 2, complete, caducous; bracts and bracteoles squamiform. Flowers monœcious, spirally arranged, ternate, the median one female, or the upper ones solitary and 2-nate male, all with bracts and bracteoles. Male flowers symmetrical, ovoid or oblong. Sepals orbicular, carinate on the back, gibbous or rotundate, broadly imbricate. Petals ovate or oblong, acute, valvate. Stamens 20-30, fasciculate, filaments short or elongate; anthers oblong or linear, attached on the back or towards the base, versatile, Pistillode styliform. Female flowers often smaller than the male, subgloboses. Sepals reniform or orbicular, broadly imbricate. Petals slightly longer, orbicular, convolute-imbricate, at the apex valvate or subvalvate. Staminodes 3 or more, minute. Ovary oblong or ovoid; stigmas 3, short sessile; ovule parietal pendulous.

Fruit ovoid or ellipsoidal, sometimes rostrate, terete or sulcate 1-locular; stigmas terminal; pericarp thick, fibrous; endocarp thin or crustaceous and smooth; seed erect, ovoid or oblong, terete or, deeply 5-sulcate; hilum reaching from the base to the top; branches of raphe obliquely descending; albumen more or less ruminate; embryo basilar.

Species—About 17.

Distribution.—Malay Archipelago, New Guinea, tropical, Australia, islands of the Pacific Ocean.

Cultivation in Europe.—Elegant stove-palms. They grow best in fibrous loam, leaf mould and sand. Perfect drainage and a liberal supply of water are essential. Propagation is effected by seeds.

PTYCHOSPERMA ELEGANS, Bl. Rumph., II., 118; H. Wandl. in Bot. Zeit., 1858, 346; H. Wandl. et Drude in Linnæa, XXXIX., 215; Scheffer in Ann. Jard. Bot. Buit., I, 121, 122, 154. Benth. Fl. Austr., VII., 141. F. V. Muell. Fragm., VIII., 222, et Syst. Cens. Austr., Pl. 120; Becc. in Bull. Soc. tosc. ort., 1883, 108; H. Wendl. in Kerch. Palm, 254, Becc. Illustr. di alc. Palme nel Giard. Bot. di Buit. in Ann. Jard. Bot. Buit., II., 87. Bot. Mag., 7345.—*Ptychosperma seaforthia*, Mig. Fl. Ind. Bat., III, 21. (non Scheffer); B. Seem. in Journ. of Bot., I., 68. *Seaforthia, elegans*, R. Br.

We include also those species on which Beccari (Ann. Jard. Buitenz., II,9091) founded the new genera *Balaka*, *Coleospadix* and *Normanbya*—See also Webbia, I (1905) p. 299-302.

Prodr. Fl. Nov. Holl., 267 (1810). Hook. Bot. Mag., t. 4961 (tantum quoad fig. 9, 10, 11. Spreng. Syst. Veg., II., 623; Mart. Hist. Nat. Palm, III., 181, 313, t. 105, 106, 109; Kth., Enum. Pl. III. 189.—Wandl. Ann., III., 462, V. 809.

NAME.—Zierliche Faltennusspalme (German).

DESCRIPTION.—A rather slender palm. Leaves 6½ feet long, recurved, regularly pinnatisect; rhachis semi-lunar, in cross section; leaflets 2 feet long, 1-3 inches broad, linear, tip very obliquely truncate and toothed, bright green, paler beneath; sheath 18-24 inches long, 6-7 inches broad.

Spadix 12-18 inches long, inserted below the leaves, very shortly peduncled, broadly triangular, repeatedly divided into strict branchlets; peduncle compressed; branchlets slender, terete. Flowers sessile, ternate, a female between 2 males, protandrous; towards the end of the branchlets glomerules of 2 male flowers only, and close to the apex single male flowers are developed. Male flowers regular, elongate, obtuse, ½ inch in diameter; sepals orbicular; petals oblong, obtuse; stamens 25-30, exserted during the time of flowering; filaments erect; anthers versatile, deeply bifid at the base, bilobed-obtuse at the apex, broadly linear; pistillode well developed, ovate at the base, attenuate into the filiform style, about as long as the stamens. Female flowers globose-oval or ovate-conical, very small; sepals and petals largely imbricate; staminodes 3-6, dentiform minute, some being sometimes larger than the rest; ovary ovate, attenuate at the apex, not perfectly symmetrical, 1-celled; stigmas 3, triangular, acute; ovule parietale, marked with 5 distinct depressions which represent the furrows of the ripe seed.

Fruit seated on the aurescent calyx, ¾ inch long, oblong, crowned with the stigmas; pericarp fleshy; mesocarp finely fibrous; endocarp finely membranous, strongly adherent to the seed. Seed globose, with 3 deep longitudinal furrows, and 2 more superficial ones; albumen much ruminate; embryo basilar.

HABITAT.—Northern and Eastern Coasts of tropical Australia, and some of its outlying islands, from Sandy Island in lat. 25° S. to Cape York in lat. 11° N.

This palm was discovered by Sir Joseph Banks during Cook's first voyage in 1770, at the mouth of the Endeavour River.

USES.—In Queensland the stems are used for the rails of fences. The small stems used sometimes go under the name of "Moreton Bay Canes." The leaves are used by the aborigines for water baskets (Maiden).

LOXOCOCCUS, Wendl. and Drude Linn., 39 (1875), 185.

(From the Greek "loxos," oblique and "coccos" kernel, berry.) Bot. Mag., t. 6358. Benth. and Hook., Gen. Pl. III, II, 888, 13.

Trunk tall, erect, cylindric, annulate; leaves pinnatisect, leaflets linear, obliquely truncate, reduplicate-plicate.

Spathes 2, cymbiform. Spadix infrafoliar, monœcious, branched Flowers ternate, mostly in clusters of a female between 2 males spirally arranged round the branches. Male flowers: sepals 3 orbicular, imbricate petals 3, much larger, ovate, valvate; stamens 9-12; filaments very short; anthers subversatile, pistillode minute, ovoid. Female flowers smaller than the male, subglobose; sepals orbicular, broadly imbricate, persistent; petals ovate, broadly imbricate, tips valvate, staminodes obsolete; ovary 1-celled, stigmas 3, minute, ovule parietal.

Fruit subglobose, cuspidately beaked; stigmas, terminal; endosperm ruminate; embryo subbasilar.

Species—1. Endemic in Ceylon.

LOXOCOCCUS RUPICOLA, Wendl. and Drude in Linnæa, XXXIX, 185 (1875); Hook. f. in Bot. Mag., t. 6358.—*Etychosperma rupicola,* Thw. Enum. 328, C. P. 2732.—*Caryota mitis* (?), Moon, Cat. 64.—*Kentia rupicola,* Bull. ex Salomon, p. 78.

Names.—Dotalu (Ceylon); Felsen-Krummnuss (German).

Description.—Trunk 30-40 feet high, 4-5 inches in diameter, dull green, base swollen, soboliferous. Leaves about 10, 6-8 feet long, 3-4 feet broad, spreading; petiole 1-1½ feet long with a short green sheathing base; leaflets 12-20 pairs, rather distant, spreading and decurved, sessile, linear, tip obliquely truncate and notched, bright green above, glaucous and sparsely furfuraceous beneath, terminal one or two pairs confluent.

Lower spathe 12 inches long, narrowly cymbiform, coriaceous, pale-brown, dotted with peltate furfuraceous scales. Spadix 12 inches long, triangular in outline, coral red, quite smooth; peduncle short, stout annulate; branches erecto-patent. Flowers blood-red, male flowers about ½ inch in diameter; filaments stout, equalling the linear anthers, pistillode minute, trifid. Female flowers ovoid; ovary obliquely ovoid; ovule pendulous.

Fruit about ¾ inch in diameter, smooth, blood red; sarcocarp fibrous.

Habitat.—On cliffs and rocks in the moist region of Ceylon, from 1,000-5,000 feet; rather common. (Endemic in Ceylon.)

Flowers in February.

Uses.—The seed is used for mastication with betel, like that of the Arecas.

Cultivation in Europe.—An elegant stove-palm. It thrives in a compost of loam, peat, and leaf soil, in equal parts, with a liberal addition of sand. When it is fully grown, loam should constitute about two-thirds of the compost; some rotten cow-manure may be added. Propagated by seeds. These require a compost similar to the one mentioned and must be put in a moist gentle heat.

This is a most attractive palm from its graceful habit and its coral-like inflorescence. Seeds of this plant were sent to Kew by Dr. Thwaites, Director of the Botanical Gardens of Peradeniya and it flowered for the first time in the Victoria House at Kew in February 1878.

ILLUSTRATION.—We reproduce on Plate LXXIV the photograph of a young specimen of *Loxococcus rupicola* from the Botanic Garden of Peradeniya. The photograph was taken by Mr. Macmillan.

(To be continued.)

A LIST OF BUTTERFLIES CAUGHT BY CAPT. F. M. BAILEY IN S. E. TIBET DURING 1913,

BY

CAPT. W. H. EVANS, R. E.

(*With a Plate and a Map.*)

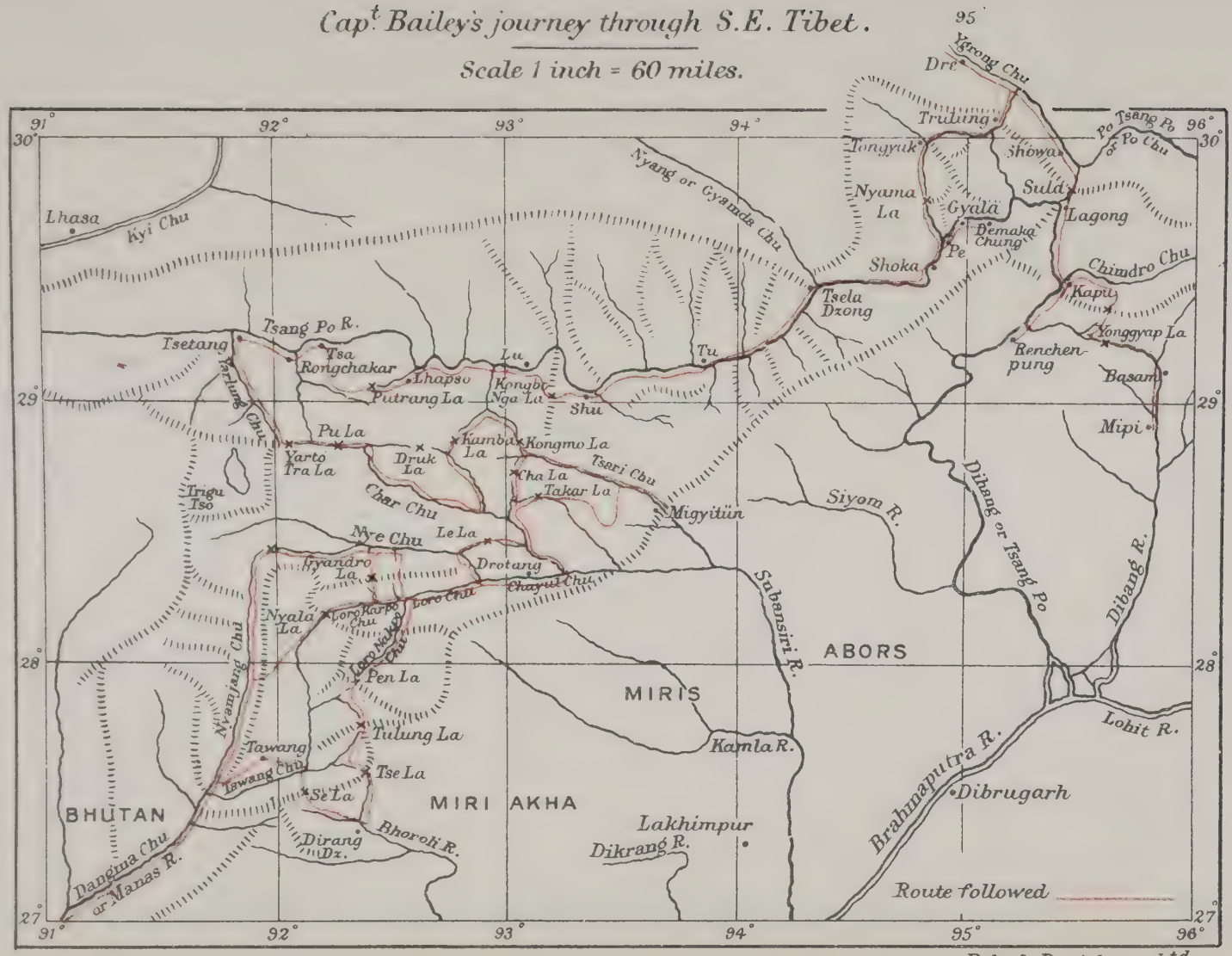
In 1913 Capts. Bailey and Morshead succeeded in traversing a previously unexplored tract of country in S. E. Tibet. A full account of their journey will be found in the proceedings of the Royal Geographical Society; the following brief narrative and the map will, however, help in explaining the localities mentioned in the list of butterflies.

Leaving the Mishmi country and the valley of the Dibang river in the middle of May, they travelled through the country east of the Tsang Po (Dihang) arriving at Kapu on that river on June 5th. Thence they travelled down the river as far as Runchenpung and then up again to Lagong (June 19th), where the Tsang Po pierces the main range, which separates India from Tibet. Above Lagong the route along the river is impassable except during the winter month and accordingly the travellers struck north over the Su La (June 23rd) into the valley of the Po Chu. They spent several weeks exploring the Po Chu and its tributaries, the Ygrong Chu and the Rong Chu, eventually crossing the Nyama La (July 13th) and reaching the Tsang Po again at Pe (July 13th). From Pe they went down the Tsang Po as far as Pemako Chung (July 21st) and then back again to Pe (Aug. 4th). The course of the Tsang Po was followed up as far as Shu (Aug. 18th) where a slight detour to the south over the Kongbo Nga La (Aug. 18) was found necessary; a second detour over the Putrang La (Aug. 28th) was made later. At Tsetang (Aug. 29th) the Tsang Po was left for good and the explorers struck south up the Yarlung Chu and over the Yartotra La (Sept. 2nd) and then over the Pu La into the valley of the Subansiri (Sept. 4th). They went down the Char Chu for four days and then up the Karpo Chu over the Kumba La into the basin of the Tsang Po: thence over the Kongmo La (Sept. 12th) into the Tsari Chu valley, another branch of the Subansiri. The Tsari Chu was followed down as far as Migyitun (Sept. 18th), whence they re-entered the Char Chu Valley *via* the Tanga La (Sept. 21st): this valley was left at Charme (Sept. 22nd) and the Nye Chu [Sept. 26th), entered *via* the Le La. They went down the Nye and Chayul valleys as far as Drotang and then up the Chayul Chu, called the Loro in its upper reaches, into the Loro Napko Chu. On October 2nd they left the basin of the Subansiri by the Pen La and proceeded *via* the Tulung La

Sketch map of

Capt. Bailey's journey through S.E. Tibet.

Scale 1 inch = 60 miles.



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and the Tse La down to Dhirang (Oct. 12th) on a tributary of the Bhoroli river. This tributary was followed to its source and, crossing the Se La, they reached Tawang on October 16th. After exploring the Nyamjang Valley and the upper waters of the Nye and Loro rivers they travelled through Eastern Bhutan and reached Dewangiri in Assam on November 13th. It may be noted that "Chu" means river and "La" pass in Tibetan.

Captain Bailey had previously taken a considerable interest in butterflies as may be seen from Mr. South's paper on the butterflies caught by him in 1911 in S. E. Tibet and the Mishmi Hills (J. B. N. H. S. XXII. 345 and 598). The country traversed in 1911 lies to the east of that dealt with in this paper and his two journeys have succeeded in practically linking up the fairly well-known district, Chumbi Valley, Gyangtse, with Western China (Szechuan). About 2,000 butterflies were obtained in 1913 belonging to nearly 200 species.

From a natural history point of view, the country traversed may be divided into five well-marked districts:—

A.—The Lower Tsang Po Valley, known as Pemako, below the gorge where the river breaks through the main range, also the country to the east towards the Mishmi Hills, May 15th to June 23rd. A densely wooded district with a heavy rainfall, elevation 3,000 to 7,000 feet. Here the greatest number of species were obtained, as might perhaps have been expected. The fauna resembled that of Upper Assam, showing a transition more or less to that of Western China. Of the 102 species captured the following may be noted as of especial interest:—

Erebia narasingha, M.
Eulepis narcaea, Hewt.
Lethe armandii, Oberth.
Ypthima methorina medusa, Leech.
Calinaga davidis, Oberth.
Gonepteryx amintha, Blanch.

B.—The Po Chu Valley, district Pome, June 23rd to July 13th, well wooded with a moderate rainfall; elevation 7,000, passes up to 14,300 feet. This proved an interesting country, as, though the Po Chu is a tributary of the Tsang Po, the two valleys are separated by snowy ranges. As compared with the Lower Tsang Po district, a marked change is noticeable in the fauna and all the 64 species obtained were palæarctic; of these the following were of interest:—

Pararge thibetana albicans, South.
Argynnis paphia and *gong*.
Four *Aporias*.
A large form of *Lycœna pheretes*.
Two *Pamphilas*.
Three *Erebias*.

Melitœa sindura jezabel.
Cyaniris oreas.
Celœnorrhinus thibetana.
Augiades bouddha, Mab.

C.—The Upper Tsang Po Valley, July 13th to end of August; elevation 8,500 to 11,000 feet, passes considerably higher. The lower portion of this district, between Pe and Pemako Chung was similar in character to the Po Chu Valley; higher up the country was more like the dry barren mountainous region to the south, which was traversed later. 43 species were obtained, many of which had already been captured in the Po Chu Valley, while others were obtained in the next district.

The following species were not encountered elsewhere:—

A variety of one of the Po Chu *Erebias.*
Aphantopus hyperanthus.
Argynnis rudra and *jainadeva.*
Gonepteryx alvinda.
Zephyrus bieti, icana and *suroia*, Tytler.
Apatura iris bieti.
Hyporion lama.
Everes ion.

D.—The mountainous country lying around the upper waters of the Subansiri between the Tsang Po and main range, which separates India from Tibet, September; elevation 11,000 to 16,000 feet. A dry barren country, which produced only 24 species, closely resembling in character the butterflies obtained in the Chumbi Valley and round Gyangtse; those of interest were:—

Vanessa urticæ chinensis.
Argynnis eugenia rhea and *gemmata genia.*
Colias cocandica.
A new species of *Lycœna.*
Melitœa didyma agar.
A new species of *Cyaniris.*
Zephyrus duma.

E.—The densely wooded country about eastern border of Bhutan within the watershed of the Bhoroli river, October; elevation 5,000 to 8,000 feet. Most of the 80 species obtained belong to forms found commonly in Sikkim, the only butterfly of any interest being *Erebia annada polyphemus.* After October but little collecting was done.

1. *Danais melanea*, Cr. A single male at Dewangiri, 1,500 feet, Nov. 13th.

2. *Danais tytia*, Gray. 2 ♂ and 3 ♀ in the Lower Tsang Po district, the Po Chu Valley, at Dhiran and Dewangiri.

3. *Euploea mulciber*, Cr. 2 ♂ at Dhiring, 5,000 feet, October.

4. *Pararye masoni*, Elwes. 1 ♀, Migyitun, 10,000 feet, Sept. 15th.

5. *Pararge thibetana albicans*, South. 32 specimens mostly in the Po Chu Valley at 7,500 to 10,500 feet in June and a few along the Tsang Po in July between Gyala and Kongbo Nga La, 9,000 to 12,500 feet.

They agree with Mr. South's description of the single specimen obtained by Capt. Bailey on his former trip (J.,B.N.H.S., xxii., 346).

6. *Rhaphicera satricus*, Doubl. 1 ♂, Po Chu valley, July 7th, 8,000 feet.

7. *Satyrus pumilus bicolor*, Stdg. 20 specimens at the end of August and in the beginning of September, 13,000 to 16,000 feet, on the Tsang Po between Kongbo Nga La and Tsetang, on the Yartotra La and in the Char Chu and Karpo valleys.

8. *Satyrus loha*, Doherty. 13 specimens mostly males at 6,000 to 8,000 feet in October and November between Tawang and Kyeri near the Bhutan border.

9. *Satyrus loha chumbica*, M. 9 males between Pemako Chung and Kongbo Nga La on the Tsang Po in August, 7,500 to 12,500 feet. 8 females in September in the Karpo Valley and at Migyitun at 10,000 to 12,500 feet. In many of the males the band was quite yellow, especially on the underside.

10. *Satyrus saraswati*, Koll. 11 worn specimens in the neighbourhood of Dhirang about the middle of October at 6,000 feet.

11. *Erebia pomena*, n. sp. (see plate). 56 specimens, including one pair in copula, mostly in the Po Chu Valley, a few at Lagong and Pemako Chung on either side of the gorge where the Tsang Po breaks through the main range; June and July, 4,500 to 9,600 feet.

Above dark velvet brown, as in *shallada*, Lang; a small apical ocellus on the forewing, single pupilled and narrowly ringed with obscure fulvous; a similar subanal ocellus on the hindwing, the fulvous ring of which is elongated outwardly and beyond there is an obscure fulvous area continued along the margin to vein 3. Below the forewing is bright fulvous except for a narrow brown area sprinkled with white scales beyond the apical ocellus; this area is continued narrowly along the outer margin and bears inwardly a dark line in addition to the terminal dark line; the inner margin somewhat broadly, the costa and base narrowly dusky; the apical ocellus as above but the fulvous ring lighter and more clearly defined. The hindwing dark brown overlaid with whitish scales; an anal ocellus in space 1 similar to the apical ocellus on the forewing and above a series of postdiscal prominent white spots in spaces 2 to 5; an ill-defined irregular-brown discal and a similar, but more obscure, subbasal line; dark subterminal and terminal lines as on the forewing. Female as male; above the apical ocellus is better defined and surrounded inwardly to the end of the cell and below to vein 3 by a fulvous area, prominent in some specimens and obscure in others; below the tone is brighter and all the markings are more clearly defined. The outer margin in both sexes is straight. In the male there is an obscure patch or modified scales on the central third of the forewing extending from the dorsum to the costa. Expanse $2\frac{1}{4}$ inches. Types in copula, Tongto, 7,500 feet, June 30th.

The new species most nearly resembles *shallada*, Lang, and is sufficiently characterised by the straightness of the outer margin and the presence of the subanal ocellus on the hindwing.

12. *Erebia pomena shuana*, sub-sp. n. (see plate). 32 speciensm along the Tsang Po between Timbe and Kongbo Nga La, 10,000 to 12,500 feet, August 5th to 18th; mostly at Shu.

Closely allied to *pomena*. The apical ocellus on the forewing is three times as large and the white pupil is very prominent; in the female there is

occasionally a second minute pupil. The fulvous anal area on the hindwing is more extensive and much lighter, usually confluent with the ring of the ocellus. Below paler and all the markings wider. Expanse 2½ inches.

13. *Erebia phyllis gyala*, sub-sp. n. (see plate). 28 specimens including one pair *in copula*, late June to early August, 8,000 to 11,000 feet; a few in the Po Chu Valley and the bulk at Pe on the Tsang Po. Also a single aberrant specimen a good deal higher up the river at Tsa near Rongchakar, 12,000 feet, August 28th.

Differs from *phyllis*, Leech in the following particulars. The ocellus on the forewing above is bordered with bright fulvous; on the hindwing there is a subanal ocellus set on a fulvous area, which is extended upwards along the margin; rarely this ocellus is absent and the fulvous area is restricted. On the hindwing below there is an irregular sub-basal and discal narrow brown line, often prominent and occasionally obsolete; the discal band is often bordered outwardly with dull yellow patches. There is nearly always a subanal ocellus and the white spots above may be prominent or obsolete.

This race is very near *inconstans*, South (J., B. N. H. S., xxii., 350) and only differs in the presence of the subanal ocellus on the hindwing; specimens without the ocellus cannot be separated from *inconstans*.

In the single female from Tsa the apical ocellus is inwardly bordered by the fulvous area, but this area does not extend below the ocellus; below the bands on the hindwing are very prominent and in addition there is a sub-terminal band; the white spots are clearly defined but very minute, and the anal ocellus is absent.

14. *Erebia tsirava*, sp. n. (see plate). 10 males in the Po Chu Valley and one at Pemako Chung on the Tsang Po, 7,500 to 9,000 feet, June 30th to August 7th.

Closely allied to, if not a race of, *annada*, M; smaller, about the size of *orixa*, M. Above it is very similar to typical *annada*, but the fulvous area below the ocellus is rather more developed, while the ocellus itself is smaller and more rounded. Below the looped band is absent from round the ocellus on the forewing; the hindwing bears a single small subanal ocellus, while the dorsal and outer margins are broadly covered with closely set white scales, leaving only a broad rectangular dark-brown costal area.

15. *Erebia annada polyphemus*, Oberth. A worn male at Tawang, 8,000 feet in October.

16. *Erebia narasingha*, M. 7 ♂, Lower Tsang Po. 3,000 to 6,000 feet, June 4th to 19th.

17. *Aphantopus hyperanthus luti*, sub-sp. n. (see plate). 54 specimens at 9,000 to 10,000 feet on the Tsang Po between Pemako Chung and Tu, July 17th to August 13th.

Above dark-brown with white cilia, bearing 3 ocelli on the forewing and 2 on the hindwing with narrow but well defined dull yellow irides, as in the form *ocellatus*. In specimens from the Amur and Corea, the ocelli are prominent in the female but tend to obsolescence in the male. Below rather pale, brown obscurely dusted over with white, especially on the hindwing where the veins are finely white; the ocelli as on the upperside but with broader brighter yellow irides; on the hindwing there is an additional ocellus in space 5, with often a small one adjoining it above, also a small ocellus in space 1. The ocelli above are usually pupilled and below always so. Very near *ocellatus*, differing conspicuously in the paleness of the colouring on the underside.

18. *Zipœtis scylax*, Hewit. Two males on the Lower Tsang Po, at 3,000 feet early in June.

19. *Ypthima newara*, M. 42 specimens on the Lower Tsang Po and in the Po Chu Valley, also one at Pemako Chung, at 3,000 to 9,000 feet in June and July ; a single specimen at Dhirang, 5,000 feet in October.

They agree best with the eastern race *sarcaposa*, Fruh, of which I have specimens from Manipur. They may, however, be referable to *chinensis*, Leech, which does not seem to be specifically distinct from *newara*.

20. *Ypthima baldus*, Fabr. 1 ♂, Dewangiri, 1,000 feet, November.

21. *Ypthima affectata*, Elwes and Edw. 2 ♀, Lower Tsang Po, 3,000 feet, June.

22. *Ypthima methorina medusa*, Leech. 4 specimens on the Lower Tsang Po, 3,000 to 8,000 feet in early June. Agrees as to races with the Indian *persimilis*, El and Ed, but is smaller and with the wings rounded.

23. *Ypthima sakra*, M. 69 specimens, 4,500 to 9,000 feet, mostly on the Lower Tsang Po, the Po Chu Valley and one at Pemako Chung, May to July, a few at Dhirang in October. They agree best on the whole with the Sikkim form, true *sakra*, but many are inseparable from the eastern race *austeni*, M. In most of the specimens the subterminal dark areas on the underside are obsolete.

24. *Lethe dyrta*, Fd. 1 ♂, Dhirang, 5,000 feet, October.

25. *Lethe confusa*, Aurivill. 1 ♂, Dewangiri, 1,000 feet, November.

26. *Lethe verma*, Koll. 3 ♂, Lower Tsang Po, 6,000 feet, June and Dhirang, 5,000 feet, October.

27. *Lethe sidonis*, Hewit. 18 specimens, 5,500 to 10,000 feet; mostly in the Po Chu Valley, June and July ; near Tawang, October ; single specimens at Migyitun, September and on the Lower Tsang Po in June.

28. *Lethe visrava*, M. 1 ♂, 4,500 feet, Lower Tsang Po, June.

29. *Lethe nicetas*, Hewit. 2 ♀, near Dhirang, 6,000 feet, October.

30. *Lethe insana dinarbas*, Hewit. 2 ♂, Lower Tsang Po, 5-6,000 feet, May and June.

31. *Lethe brisanda*, Den. 3 ♂, Lower Tsang Po, 5-6,000 feet, June.

32. *Lethe serbonis*, Hewit. 1 ♂ near Pe, 9,400 feet, on the Tsang Po on August 2nd and a ♀ near Dhirang, 7,000 feet, Oct. 10th.

33. *Lethe chandica*, M. 1 dry season ♂.

34. *Lethe distans*, Butl. 1 dry season ♂.

35. *Lethe scanda*,

36. *Lethe bhairava*, M. 6 ♂.

37. *Lethe gulnihal*, de N. 1 ♂.

38. *Lethe sinorix*, Hewit. 1 ♂.

39. *Lethe sura*, Doubl. 1 ♂.

40. *Lethe pulaha*, M. 1 ♂.

41. *Lethe armandii*, Oberth. 2 ♂, dry season form.

42. *Lethe yama yamoides*, M. 1 ♂.

Nos. 33—42 all obtained on the Lower Tsang Po, 3—7,000 feet, in June.

43. *Neorina hilda*, Westw. 1 ♂ near Dhirang, 7,000 feet, October.

44. *Mycalesis mestra*, Westw. 1 ♂, Lower Tsang Po, 6,000 feet, June.

45. *Mycalesis suavolens*, de N. 4 ♂, Lower Tsang Po and Po Chu Valley 5—8,000 feet, June and early July.

46. *Mycalesis misenus*, de N. 1 ♂ ; Lower Tsang Po, 3,000 feet, June.

47. *Melanitis phedima bela*, M. 1 ♂ dry season form.

48. *Anadebis himachala*, M. 5 specimens.

49. *Clerome eumeus assama*, Westw. 2 ♂.

50. *Thaumantis diores*, Westw. 1 ♂.

51. *Discophora tullia zal*, Westw. 1 ♂.

52. *Enispe euthymius*, Doubl. 1 ♂.

53. *Enispe cycnus*, Westw. 1 ♀.

54. *Eulepis dolon centralis*, Roth. Sch. 4 ♂.

55. *Eulepis eudamippus*, Doubl. 1 ♂.

Nos. 48—55 all obtained on the Lower Tsang Po, 3,000—7,000 feet in June.

56. *Eulepis narcaæ*, Hewit. 25 ♂ Lower Tsang Po, 2,600—5,000 feet early in June.

57. *Apatura iris bieti*, Oberth. One pair on the Lower Tsang Po, below Pe at 9,000 feet at the end of July and early in August.

58. *Apatura parisatis*, Westw. 5 ♂ on the Lower Tsang Po, 3,000 feet in June.

59. *Euthalia franciæ*, Gray. 1 ♂, same locality as last.

60. *Euthalia phemius*, Doubl. 1 ♂, Dewangiri, 1,000 feet, November.

61. *Euthalia telchinia*, Mènèt. 1 ♀, Lower Tsang Po, 3,000 feet, June.

I identify the specimen as *telchinia* with some doubt. It is dark-brown above, the outer areas beyond the cells being abruptly paler, but darkening slightly again towards the apex of the forewing and the outer margin of the hindwing. On the forewing the outer edge of the dark area is bent inwards at vein 2 and runs obliquely to the anal angle ; there are two obscure pale bands in the cell and a discal row of similar spots near the bases of spaces 2—4. Beneath, the ground colour is pale olive-brown, the basal half of the hindwing being dusted with bluish white ; there are the usual markings in the cells and a discal and subterminal band on both wings, the discal band on the forewing being much broken ; the white spot in 2 is very large and prominent, those above it small and inconspicuous ; the apex of the forewing is tipped with white.

62. *Liminitis austenia*, M. 3 ♂ on the Lower Tsang Po, 2,600 to 4,000 feet in June. The specimens were typical.

63. *Liminitis danava*, M. 1 ♂.

64. *Liminitis daraxa*, Doubl. 3 ♂.

65. *Liminitis dudu*, Westw. 1 ♂.

66. *Pantoporia asura*, M. 1 ♂.

Nos. 63—68 on the Lower Tsang Po, 3,000 feet, June.

67. *Pantoporia jina*, M. 2 ♂, Lower Tsang Po, 5,500 feet, June and 1 ♂, Dhirang, 6,500 feet, October.

68. *Pantoporia opalina*, Koll. 4 ♂, Lower Tsang Po, 3,000 feet, June, Po Chu Valley, 7,500 feet, July and Dhirang, 6,500 feet, October.

69. *Neptis hylas emodes*, M. 24 specimens at 3-4,000 feet, on the Lower Tsang Po in June, also near Dhirang, 6,500 feet, October.

70. *Neptis yerburyi*, Butl. 4 specimens, Lower Tsang Po, 6,500 feet June, Po Chu Valley, 8,000 feet, June, and Dhirang, 6,500 feet, October.

71. *Neptis sankara*, Koll. 1 ♂, Po Chu Valley, 8,000 feet, July.

72. *Neptis zaida*, Doubl. 1 ♂ Lower Tsang Po, 3,000 feet, June. Differs from typical specimens in that on the upperside there is no trace of the discal streak extending into space 2 and that the underside is a good deal darker.

73. *Neptis vikasi harita*, M. 3 ♂ and 1 ♀, Lower Tsang Po, 3,000 feet, June, of the wet season form *pseudovikasi*, M.

74. *Cyrestis thyodamas*, Boisd. 3 ♂, Lower Tsang Po and Po Chu Valley, 3-7,000 feet, June and July.

75. *Junonia orithyia*, L. 16 specimens, Lower Tsang Po, June, and near Dhirang, October, 5-8,000 feet.

76. *Junonia hierta*, Fab. 1 ♂, Dhirang, 6,500 feet, October.

77. *Junonia atlites*, Johan. 1 ♂, Nyamjang Valley, 8,000 feet, October.

78. *Vanessa cardui*, L. 3 ♂, Po Chu Valley, 9,000 feet, June; Pe, 10,000 feet, July; Nyamjang Valley, 8,000 feet, October.

79. *Vanessa indica*, Herbst. 5 specimens, Lower Tsang Po, 5,500 feet, June; Dhirang and Nyamjang Valley, 5,500-7,000 feet, October.

80. *Vanessa canace*, Johan. 1 ♂, Lower Tsang Po, 7,000 feet, June.

81. *Vanessa cashmirensis*, Koll. 11 specimens, Dhirang, Tawang and the Nyamjang valley, 6-10,000 feet, October.

82. *Vanessa urticæ chinensis*, Leech. 12 specimens; a few worn specimens in the Po Chu Valley, 8-10,000 feet, July; a few at the Pe on the Tsang Po, 10,000 feet, July; the remainder in the high country, south of the Tsang Po, 12-15,000 feet, September.

83. *Vanessa ladakensis*, M. 28 specimens in the high country south of the Tsang Po, 14-16,000 feet, September.

84. *Vanessa c-album thibetana*, Elwes. 2 ♂, Po Chu Valley, 7,000 feet, July, and Karpo Valley, south of the Tsang Po, 12,500 feet, September.

85. *Araschnia prorsoides dohertyi*, M. 2 ♂, Po Chu Valley, 7,000 feet, July, and at Rongchakar on the Tsang Po, 9,000 feet, July.

86. *Symbrenthia hypselis cotanda*, M. 2 specimens, Lower Tsang Po 3-6,000 feet, June.

87. *Argynnis hyperbius*, Johan. 9 specimens, Lower Tsang Po, 3-5,000 feet, May and June; Dhirang, 5,000 feet, October.

88. *Argynnis childreni*, Gray. 6 specimens, Lower Tsang Po, 4-7,000 feet, June; Po Chu Valley, 7,000 feet, July; Dhirang, 7,000 feet, July.

89. *Argynnis paphia megalegoria*, Fruh. One pair Po Chu Valley, 7,000 feet, July. Very like the typical *paphia*, L., but larger and more brilliantly coloured.

90. *Argynnis laodice rudra*, M. 4 ♂, on the Tsang Po between Pe and Tu, 9-10,000 feet, July and August. The specimens are intermediate between *samana*, Fruh, from W. China and *rudra* from Assam; smaller and paler than *rudra*, though not so much so as *samana*; below no green at the apex of the forewing, therein resembling *samana*; the sub-basal brown band on the hindwing broad as in *rudra*.

91. *Argynnis adippe jainadeva*, M. 46 specimens on the Tsang Po between Gyala and Tu, 9-10,000 feet, July and August. Rather paler than typical *jainadeva*, but not so pale as the Ladak race *pallida*, Mihi.

92. *Argynnis lathonia issæa*, Doubl. 24 specimens, Lower Tsang Po and Po Chu Valley, 7-10,000 feet, June and July; Tawang, 10,000 feet, October.

93. *Argynnis clara manis*, Fruh. 8 specimens in the high country south of the Tsang Po, 10-15,000 feet, September.

94. *Argynnis gong*, Ober. One worn female, Po Chu Valley, 10,000 feet, July.

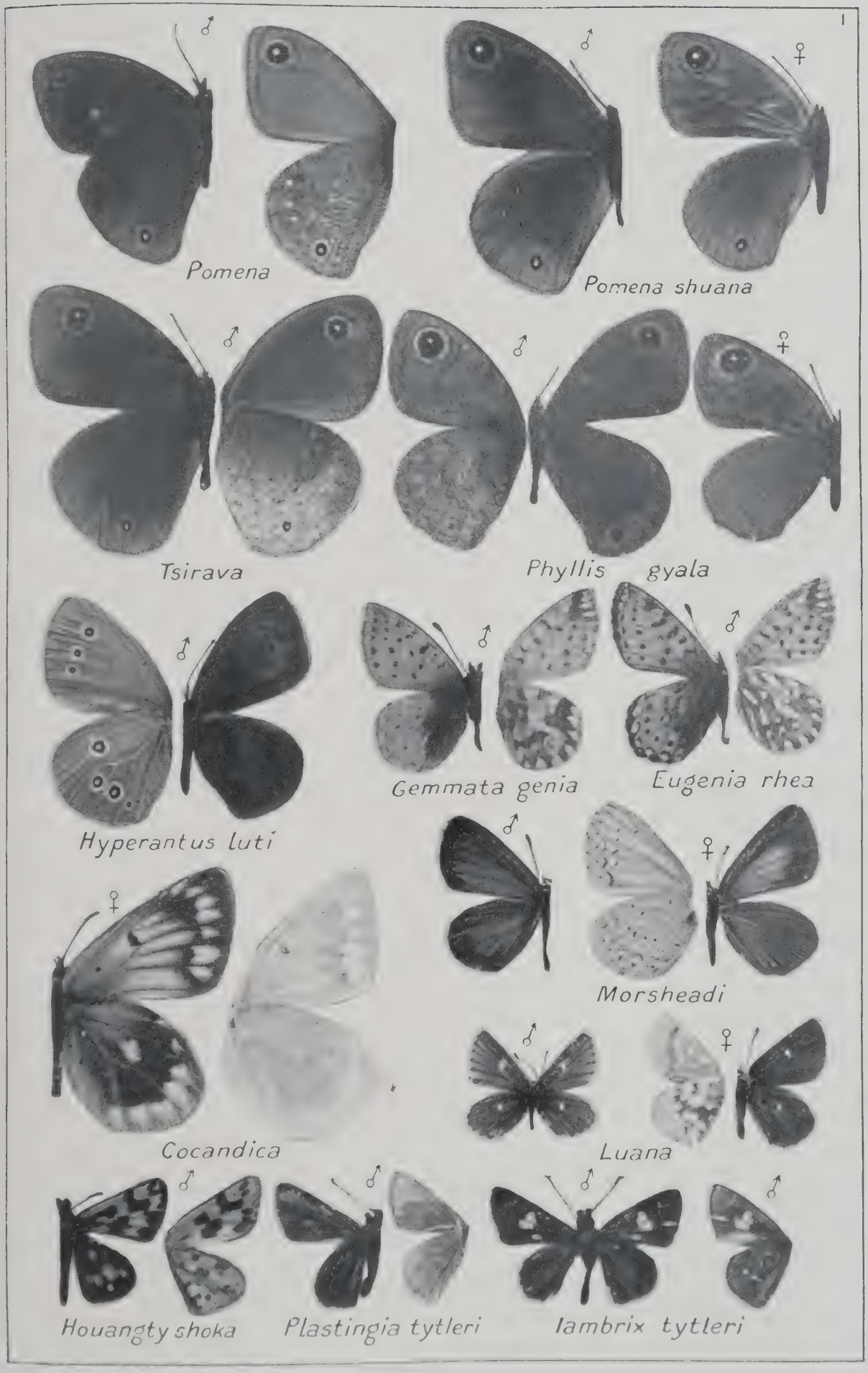
95. *Argynnis gemmata genia*, Fruh. (see plate). 24 specimens at 12-16,000 feet in the high country south of the Tsang Po in September; in several the silver colouring on the underside is replaced by yellow, and this variety may be called *fulva*, nov.

96. *Argynnis eugenia rhea*, Groum. (see plate). 42 specimens caught at 12-16,000 feet at Lu on the Tsang Po and in the high country to the south in August and September.

These two species are very similar in general appearance. In *genia* vein 10 is emitted at the end of the cell, thus it falls in true *Argynnis*, while *rhea* appertains to Moore's genus *Boloria*, as this vein is emitted well beyond the cell. I would, however, remark that this feature is of little value from a generic point of view, as in *clara*, Blanch, the vein is emitted well after the end of the cell and in the race *manis*, Fruh, just after that point. In the *gemmata* group, which includes *eugenia* and *altissima*, the pattern of the hindwing below does not vary appreciably; in *gemmata*. But, and its dwarf race *genia* the silver spot at the centre of the costa is more or less upright and square in shape, also the cinnamon red areas are broad and prominent: in *altissima* and *eugenia* the spot mentioned is sloping and the red areas are indistinct. *Genia*, if my identification is correct, is remarkable in that the marginal black band, prominent in the other allied species, is absent and the cilia are concolourous with the ground colour. *Altissima* appears to be a good species; vein 10 arises just after the end of the cell; the forewing is sharply pointed and the outer margin straight below that point; all the silver markings on the underside are narrow and elongated, while the black spot near the base of cell 2 on the forewing above is placed nearer the outer margin than in the other species of the group. *Eugenia*, Eversman, is a species flying from South Siberia, through West China and Tibet to the Himalayas; vein 10 arises well beyond the end of the cell, its origin being equi-distant between that point and the origin of vein 9; in the nymotypical Northern form the large silver spot crossing the end of the cell on the hindwing below is quite short; in the Tibetan race *rhea*, described from Amdo, it is elongate as in *gemmata*. *Mackinnoni*, de N., from the Himalayas, is, I am convinced, a race of *eugenia* and has nothing to do with *altissima*; it hardly differs from *rhea*, but the cinnamon red areas below are rather more prominent and the cilia above are concolourous with the ground colour instead of being whitish.

97. *Melitæa sindura jezabel*, Oberth. 102 specimens in the Po Chu Valley and on the Tsang Po between Gyala and Du and just beyond the Kongbo Nga La at 10-13,000 feet in July and August. The specimens appear to be nearest to *jezabel* from Eastern Tibet. Above dark, the outer band strongly developed; below very brick red, the forewing often without any discal markings. Specimens I have from Gyantse are very similar differing only in the lesser development of the outer discal band on the forewing above. Both are very different from the small dull Chumbi Valley form *sikkimensis*, M. and are nearer to *balbita*, M. from Kashmir, though smaller.

98. *Melitæa didyma agar*, Oberth. 57 specimens mostly on the Tsang Po between Gyala and Lhapto at 9-13,000 feet in July and August and a few



TIBETAN BUTTERFLIES.

in the Karpo Valley to the south at 12-14,000 feet in September. There seems no justification for separating *agar* from *didyma*. Capt. Bailey's specimens are practically identical with Seitz's figures of *agar*; in many of the females there is a good deal of the orange ground colour showing through.

99. *Pseudergois wedah*, Koll. 3 specimens on the Lower Tsang Po at 5,000 feet in June and at Dhirang, 5,000 feet, October.

100. *Calinaga davidis*, Ober. 1 ♂, Lower Tsang Po, 3,000 feet, June.

101. *Libythea celtis lepita*, M. 37 specimens on the Lower Tsang Po and in the Po Chu Valley, 4-8,000 feet, June and early July.

102. *Hyporion lama*, Leech. One specimen at Gyala on the Tsang Po at 9,800 feet on July 17th. The single male obtained agrees closely with *lama*, but the two upper spots of the ferruginous sub-marginal band are white and divide discal spots on both wings which are more developed. The underside is a replica in every way of the upperside, but the ground colour is dark ferruginous; there is a pale yellow spot in the cell of both wings and the white spots of the upperside are developed into a continuous well defined sinuate band across both wings; the outer margins are paler.

103. *Dodona dipœa*, Hewit. 6 specimens, Lower Tsang Po and Po Chu Valley, 3-8,000 feet, June and early July.

104. *Dodona eugenes*, Bates. 5 specimens in the same localities and at Dewangiri, 6,000 feet, November.

105. *Dodona ouida*, M. 6 ♂, Lower Tsang Po, 7,000 feet, June.

106. *Dodona adonira*, Hewit. 7 ♂, Lower Tsang Po, 3-6,000 feet, June.

107. *Stiboges nymphidia*, Butl. 2 ♂ and 1 ♀, Lower Tsang Po, early June, 3-6,000 feet.

108. *Papilio aeacus*, Fldr. 1 ♂, Lower Tsang Po, 3,000 feet, June.

109. *Papilio varuna astorion*, Wd. 1 ♂, Dhirang, 7,000 feet, October.

110. *Papilio philoxenus polyeuctes*, Doubl. 2 ♂, same locality.

111. *Papilio machaon sikkimensis*, M. 2 ♂, Po Chu Valley, 11,000 feet, June and 1 ♂ on the Tsang Po near Tu, 10,000 feet, August.

112. *Papilio helenus*, L. 3 ♂.

113. *Papilio chaon*, Westw. 1 ♂.

114. *Papilio janaka*, M. 1 ♂.

115. *Papilio protenor euprotenor*, Fruh. 1 ♀.

116. *Papilio rhetenor*, Westw. 1 ♂.

117. *Papilio polyctor triumphator*, Fruh. 2 ♂.
Nos. 112-117, Lower Tsang Po, 3-6,000 feet, June.

118. *Papilio polytcor yanesa*, M. 1 ♂, Nyamjang Valley, 7,000 feet, October.

119. *Papilio krishna*, M. 1 ♂.

120. *Papilio glycerion*, Gray. 6 specimens.

121. *Papilio eurous sikhimica*, Heron. 6 specimens.

122. *Papilio cloanthus*, Westw. 1 ♂.

123. *Papilio bathycles chiron*, Wallace. 1 ♂.

124. *Papilio sarpedon*, L. 1 ♂.
Nos. 119-124, Lower Tsang Po, 3-6,000 feet, June.

125. *Parnassius epaphus sikkimensis*, Elw. 108 specimens on the Putreng La and the passes to the south of the Tsang Po, August and September, 14,500 to 16,300 feet. Amongst them several virgin females.

126. *Parnassius imperator intermedia*, Rothsch. 32 specimens on the Konghbo Nga La and the passes to the south of the Tsang Po, August and September, 14,500 to 16,300 feet. This race is quite different in appearance to the very distinct yellow race *augustus*, Fruh. from the Chumbi Valley; the ground colour is pure white and the black dusting of the nymotypical form is absent.

127. *Delias belladonna lativitta*, Leech. 11 specimens in the Po Chu Valley and at Pemako Chung on the Tsang Po, 7-9,000 feet, July.

128. *Delias belladonna ithiela*, But. 6 specimens, Lower Tsang Po, 3-6,000 feet, June.

129. *Aporia hippia*, Brem. 65 specimens, Po Chu Valley and on the Tsang Po between Gyala and Pe, 7,500-10,500 feet, June and July.

130. *Aporia bieti*, Oberth. 12 specimens, Po Chu Valley, 11,000 feet, end of June and early July.

131. *Aporia delavayi*, Oberth. 10 specimens in the Po Chu Valley and on the Tsang Po below Pe 8,000-9,500 feet, end of June to early August.

132. *Aporia agathon*, Gray. 22 specimens, Lagong on the Lower Tsang Po and the Po Chu Valley, 5-8,000 feet, end of June and early July.

133. *Aporia larraldei melania*, Oberth. 2 ♂ and 1 ♀ in the Po Chu Valley and at Pemako Chung on the Tsang Po, July, 10,000 feet.
The specimens obtained were more or less intermediate between *melania* and *paracraea*, de N. below as *paracraea*, above as *melania*: *harrietae*, de N. from the Bhutan Frontier, of which as far as I know only the type pair exists in the Calcutta Museum, is also very close. The variation in *larraldei* seems to be very similar to that in *agathon* and possibly many of the so-called races are really only varieties of the pale nymotypical form.

134. *Pieris brassicae*, L. 5 specimens between Dhirang and Tawang at 5-10,000 feet in October.

135. *Pieris canidia*, Spar. 50 specimens, in all the districts traversed at 4,800 to 13,000 feet.

136. *Pieris melete montana*, Verity. 26 specimens, Lower Tsang Po and Po Chu Valleys, 5-8,000 feet, June and July; Dhirang and the Nyamjang Valley, 6,000 feet, October. All the specimens belonged to the large Eastern race; there was nothing approaching the dark Chumbi Valley form *melania*, Rob.

137. *Pieris chumbiensis*, de N. 1 ♀ on the Nyama La, 14,500 feet, July 12th. The markings are wider than usual, but the species is very variable.

138. *Huphina nadina*, Lucas. 4 ♂ of the dry season form, Dewangiri, 1,500 feet, November.

139. *Appias indra*, M. 2 ♂, Lower Tsang Po, 3-5,000 feet, May and June.

140. *Appias lalage*, Doubl. 34 specimens, Lower Tsang Po, 5,000 feet, May and June and at Dewangiri, 1,500 feet, November.

141. *Gonepteryx amintha*, Blanch. 6 specimens, Lower Tsang Po and the Po Chu Valley, 5-7,000 feet, June and July.

142. *Gonepteryx alvinda*, Blanch. 19 specimens between Pe and Shu on the Tsang Po, 9-10,000 feet, July and August. I have identified this species

from Seitz's figures and very brief description; they do not, however, differ from the specimens caught by Capt. Bailey in 1911 and identified by Mr. South as *aspasia*. Men. (J. B. N. H. S. xxii. 603). *Alvinda* appears to differ from the Indian *zaueka*, M. in that the outer margin of the hindwing is not crenulate between the tail at the end of vein 3 and the anal angle.

143. *Colias berylla*, Fawe. 10 specimens in the high country south of the Tsang Po at 14-16,000 feet, in September. All the specimens very worn. *Berrylla* seems to connect *motium*, Ober. with *ladakensis*, Fd. The females obtained were pale yellow like the males.

144. *Colias cocandica*, Ersch. (see plate). 7 specimens caught with *berrylla* and a few at Lu on the Tsang Po, 14,000 feet, August. I leave the correct name to a *Colias* expert.

145. *Dercas lycorias*, Doubl. 8 specimens, Lower Tsang Po, 5,000 feet, May and near Dhirang, 7,000 feet, October.

146. *Terias laeta*, Bdl. 2 ♂, Nyamjang Valley, 6,000 feet, October.

147. *Terias silhetana*, Wallace. 1 ♂, Dewangiri, 1,500 feet, November.

148. *Terias hecabe*, L. 7 specimens, Dhirang and Nyamjang Valley, 6-7,000 feet, October.

149. *Cyaniris marginata*, de N. 1 ♂, Lower Tsang Po, 4,000 feet, June.

150. *Cyaniris albocærulea*, M. 2 ♂, Lower Tsang Po, 4-7,000 feet, June.

151. *Cyaniris dilecta*, M. 1 ♂, Dhirang, 6,000 feet, October.

152. *Cyaniris argiolus jynteana*, de N. 15 specimens, Lower Tsang Po and Po Chu Valley, 4-8,000 feet, May and June; also near Dhirang and the Nyanjang Valley, 6,000 feet, October. One of the specimens obtained in the first-named locality is quite different to the remainder, it resembles *coelestina*, Koll, in having the black border on the forewing above narrow, but widening at the apex, but the cilia are prominently chequered with black at the ends of the veins and there is an indistinct pale discal patch; below the spots are arranged as in the *argiolus* group, the spots on the forewing are, however, linear, that in space 3 being oblique, while the spots on the hindwing are large, prominent and rounded, 5 that in space 3 being produced outwardly.

153. *Cyaniris oreas*, Leech. 80 specimens mostly in the Po Chu Valley, 7-8,000 feet, June and July; a few at Migyitun, 10,000 feet, September and at Tawang, 8,000 feet, October. The Migyitun specimens averaged a good deal smaller.

154. *Cyaniris morsheadi*, n. sp. (see plate). 64 specimens on the Tsang Po between Gyala and Lapso, 9-14,000 feet, July and August; also a few between the Khamba La and the Kongma La, south of the river, 12,500 feet, September.

Male dark-blue above, a good deal darker than is usual in this genus; the black border very broad, rather broader than in *transpecta*, M., of uniform width, curved round somewhat at the apex of the forewing: costa of the forewing very narrowly black, the costa and inner margin of the hindwing dusky. Below the pattern is exactly similar to that in the *argiolus-oreas* group; all the spots are small and rounded, everywhere complete: on the hind wing there is a greenish tinge increasing in intensity towards the base. In the female the blue colouration is very dark and restricted to a large patch in the middle, the rest of the forewing being black; there is black spot at the end of the cell; the hindwing is uniform black with an obscure deep-blue sheen towards the base. Size intermediate between *coelestina* and

huegeli, M. The species is evidently a member of the *argiolus* group and may be easily recognised by the broad black outer margin in the male.

155. *Lycæna younghusbandi*, Elwes. 2 ♂, Yartotra La, 16,000 feet, September.

156. *Lycæna semiargus annulata*, Elwes. 6 specimens, Yarlung Valley, 13,000 feet, early September.

157. *Lycæna lanty*, Oberth. 1 ♂, Po Chu Valley, 8,500 feet, July. The specimen is very worn and the identification is in consequence rather open to doubt.

158. *Lycæna stoliczana*, Fldr. 43 specimens. A few in the Po Chu Valley, 10,500 feet, July; the bulk on the Tsang Po between Tu and Rongchakar, August; a single female in September at 12,500 feet between the Khama La and the Kongma La. Extremely variable.

159. *Lycæna luana*, n. sp (see plate). 6 specimens at Lu, 15,000 feet, August 19th; on the Putrang La, 16,300 feet, August 25th; on the Gyemo La, 15,000 feet, Sept. 4th; on the Le La, 12,000 feet, Sept. 23rd.

Male above very dark-brown obscurely powdered with white, more especially so towards the outer margin; cilia broadly pure white, with a minute terminal black spot at the end of each vein; in the female the white dusting is obsolete. On both wings there is a prominent white spot at the end of the cell, which in some males on the forewing is extended inwards along the sub-median vein as a narrow streak to one-third distance from the base. Forewing below base to half way between the end of the cell and the margin very pale plumbeous, beyond cream white; the inner edge of the white area is parallel to the margin as far as vein 4 and then is bent inwards to the costa; on this area there is a similarly bent ferruginous line which is prominent towards the costa and nearly obsolete towards the inner margin: a prominent white spot at the end of the cell. Hindwing, extreme base pale greenish white, followed by a ferruginous area to well beyond the cell, which is again followed by a broad cream white area as on the forewing: on the ferruginous area there are a number of large white spots, *viz.*, 4 basal, one at the end of the cell and a row of 5 on the disc, the lower ones being adjacent to the pale outer area; cilia as above. Eyes smooth. The upperside of the female has been described above. Below the hindwing resembles the male; the forewing may be described as pale silky plumbeous, with the following portion cream white, *viz.*, a spot in and another at the end of the cell, the outer margin broadly and a discal row of contiguous spots bent inwards in the middle and increasing in size towards the costa. Size of *Lycæna iris*, Stdg.

A very distinct little species, with no near ally that I know of; above there is a general resemblance to Seitz's figure of *Lycæna astrarche* ab *artaxerxes*, Fab. but below I know of nothing at all to compare it with. The antennæ are white below and alternately black and white above; venation as in *Cyaniris*.

160. *Lycæna pheretes*, Hbn. 5 ♂ and 1 ♀ mostly in the Po Chu Valley and few at Gyala on the Tsang Po, 9-10,500 feet, July and early August. This may turn out to be a new race of *pheretes*. It resembles in appearance *lehana*, M., but differs remarkably in size, being even larger than true *pheretes*, more as *stoiczana*, Fd. Forewing pointed as in *asiatica*, El.; on the upperside of the hindwing there is a prominent row of black sub-marginal spots, which other forms of *pheretes* do not appear to possess. Below the markings are very variable, but do not differ from those prevailing in other forms. The female is dark-brown with some very dark indigo blue at the bases. If a new name is needed, I propose *major*.

161. *Lycæna asiatica*, Elwes. 25 specimens at 12-16,000 feet; a few on either side of the Putrang La, late in August, and the bulk in the high country south of the Tsang Po in September.

162. *Zizera maha*, Koll. 22 specimens on the Lower Tsang Po and in the Po Chu Valley, June and July, 4-8,000 feet; also a few near Dhirang, 6,000 feet, October. Many of the specimens are referable to *opalina*, Pouj.

163. *Everes argiades dipora*, M. 1 ♂ Dhirang, 6,500 feet, October.

164. *Everes ion*, Leech. 17 specimens on the Tsang Po between Pe and Tu, 10,000 feet, early August.

165. *Orthomiella pontis*, Elwes. 1 ♂, Lower Tsang Po, 5,500 feet, June

166. *Polyommatus boeticus*, L. 1 ♂ at Tu on the Tsang Po, 10,000 feet, August and 1 ♀, Dhirang, 6,500 feet, October.

167. *Zephyrus duma*, Hewit. 1 ♀ in the Char Chu Valley at 12,000 feet in September. A somewhat surprising capture.

168. *Zephyrus suroia*, Tytler. 1 ♀ in perfect condition at Pemako Chung on the Tsang Po, 9,000 feet, July 23rd. The butterfly has hitherto only been found at Suroi Fui in the Manipur district. This remarkable bright metallic blue female is not difficult to identify.

169. *Zephyrus bieti*, Oberth. 7 specimens between Gyala and Tu on the Tsang Po, 9-10,000 feet, middle of July to middle of August. Rather larger than usual; the orange spots on the disc of the forewing in the female are smaller than usual.

170. *Zephyrus icana*. M. 1 ♂, near Tu on the Tsang Po, 10,000 feet, Aug. 10th. Agreeing well as regards the upperside with typical *icana* from Kulu, but below there is no ferruginous tinge at all; the ground colour is rather pale brown and the bands dark-brown while the silver lining to the discal bands is very obscure.

171. *Ilerda viridipunctata*, de N. 1 ♂ Lower Tsang Po, 5,000 feet, June and 1 ♂ Nyamjang Valley, 6,000 feet, October.

172. *Ilerda moorei*, Hewit. 23 specimens mostly in the Po Chu Valley and on the Tsang Po between Pe and Dokar, 9-10,000 feet, June and July also a few between Dhirang and the Nyamjang Valley, 6-8,000 feet, October.

173. *Chrysopanus phlæas*, L. 83 specimens, a few in the Po Chu Valley at 8-10,000 feet, June; the majority on the Tsang Po between Pemako Chung and Shu, July, and in the high country to the south in August, 12-15,000 feet; a few at 7,000 feet in the Nyamjang Valley in October. Very similar to the European form.

174. *Arphnæus lohita*, Horsf. 1 ♂, Lower Tsang Po, 3,000 feet, June.

175. *Arhopala rama*, Koll. 3 specimens, Po Chu Valley, early July, 7-8,000 feet.

176. *Rapala nissa*, Koll. A male in the Po Chu Valley, 8,000 feet, end of June and a female at Pemako Chung, 9,000 feet, July. The specimens differ somewhat from the typical form in that the orange areas above are enlarged and below the ground colour is darker than usual.

177. *Chliaria kina*, Hewit. 2 ♂, Lower Tsang, 5-7,000 feet, early June.

178. *Celænorrhinus pyrrha*, de N. 1 ♀, Lower Tsang Po, 4,000 feet, June.

179. *Celænorrhinus leucocera*, Koll. 1 ♀, locality as last.

180. *Celænorrhinus pulomaya*, M. 2 specimens, near Dhirang, 6,500 feet, October.

181. *Celænorrhinus thibetana*, Mab. 4 specimens in the Po Chu Valley, 8,000 feet, end of June.

182. *Tagiades pralaya*, M. 2 ♂ Lower Tsang Po, 3,000 feet, June.

183. *Pamphila dieckmanni*, Græser. 3 specimens, Po Chu Valley, 8-9,000 feet, early July.

184. *Pamphila houangty shoka*, subsp. n. (See plate). 16 specimens mostly in the Po Chu Valley and a few on the Tsang Po between Pe and Tu, June and July, 8-10,500 feet.

Above as *houangty*, Oberth, but the black markings enlarged, the lower discal spot on the forewing being extended to the inner margin. The hindwing is black bearing the following yellow spots, a medium sized one in the middle of the cell, with a small one on the costa above it nearer the outer margin, a discal row of 3 spots, of which the upper one is very large and has outwardly beyond it on either side a small spot near the margin. Below the markings are as above, but those towards the apex are obsolescent ; hindwing as above, but the black ground colour is overlaid with yellow brown, only differing very slightly in shade from the yellow markings. Rather larger than *houangty*. *Houangty* is yellow with black markings, while *shoka* is black with yellow markings.

185. *Ochus subvittatus*, M. 3 specimens, Lower Tsang Po, early June, 3,000 feet.

186. *Sebastonyma dolopia*, Hewit. 1 ♂, Lower Tsang Po, 4,000 feet, June.

187. *Notocrypta feisthamelii*, Bdv. 1 ♂, Lower Tsang Po, 4,500 feet, June.

188. *Augiades bouddha*, Mab. 9 ♂, Po Chu Valley, 7-9,000 feet, end of June and early July.

189. *Halpe homolea*, Hewit. 7 ♂ and 1 ♀, Lower Tsang Po, 3-5,000 feet, June.

190. *Halpe aina*, de N. 1 ♀, Lower Tsang Po, 5,000 feet, June.

191. *Parnara aurociliata*, Elwes and Edw. 3 ♂, Lower Tsang Po, 5-6,000 feet, June. The specimens work out to *aurociliata* by Elwes and Edwards' key ; the fringes are bright yellow, but otherwise the description does not altogether agree. On the forewing there is a single spot in the cell against the lower edge ; a discal row of spots in spaces 2 to 4, that in 2 quadrate, that in 3 also quadrate, but half the size, that in 4 minute and rounded ; the usual small apical spots in 6-8 ; no spot in 1 a.

192. *Parnara calaca*, M. 2 ♀, near Dhirang, 6,000 feet, October.

Note.—I have taken the opportunity to figure two species, of which I have recently published descriptions, *viz.*—

Iambrix tytleri, Evans, and *Plastingia tytleri*, Evans, from Manipur.

NOTES ON THE BIRDS OF UPPER ASSAM.

BY

H. STEVENS, M B.O.U.

(*With a plate.*)

ADDITIONS AND ERRATA TO PART I.

82 *A*. *Bhringa remifer* (Temm.) [339].—The Lesser Racket-tailed Drongo. Resident throughout the who le area in forest. It is no unusual occurrence in ones' rambles in the dense evergreen forest to come upon a pair of these Drongos in company with a large and varied assortment of small birds, Warblers, Babblers, &c., in such a quarter that allows of the penetration of the sun's rays. The whole surrounding vegetation is then alive with movement and twitterings. It can be seen to what purpose and how beautifully nature has adapted the seemingly extraordinary development of the elongated tail feathers with the spatulate extremity to serve as a rudder during its aerial dives within a confined and obstructed space. Both this and the next species are strictly forest Drongos though occasionally frequent the outskirts of the forest.

ERRATA AND ADDITIONS TO PART I.

Page 235, line 19, for fragmentary *read* frequent.
„ 238, „ 11, from the bottom, for nearly *read* near ally.
„ 239, „ 8 „ „ „ for McClell *read* [McClell.]
„ 241, „ 12, for Hodgs. *read* Blyth.
„ 242, „ 32, for *Myiophoneus* read *Myiophonus*.
„ 246, „ 4, for 14-4-04 *read* 14-6-04.
„ 249, „ 1, for dusty *read* dusky.
„ 249, „ 2, for dusty *read* dusky.
„ 253, „ 17, for move *read* prove.
„ 253, „ 34 *add* June.
„ 254, „ 14, for 21-6-04 *read* 21-7-04.
„ 255, „ 23, for Chota Tinrai *read* Chota Tingrai
„ 257, „ 20, for Poobamukh *read* Pobhamukh.
„ 260, „ 1, for *svecica* read *suecica*.
„ 262, „ 6, from bottom,for Gurrung, January *read* Gurrung Jan.
„ 263, „ 16, from bottom, for *purctulata* read *punctulata*.
„ 264, „ 14, from top, for ♂ *read* ♀.
„ 266, „ 10, from bottom, for hold *read* hoed.
„ 268, „ 24, for *Arachnethera* read *Arachnothera*.
„ 268, „ 30 „ „ „
„ 268, „ 9, from bottom, for *iqnipectus* read *ignipectus*.

PART II

244. *Pitta nipalensis nipalensis* (Hodgs.) [927].—The Blue-naped Pitta. Occurs throughout the plains in the cold weather at all events. Margherita, December, February, March; Rungagora, January; Dejoo, 4-6-10, a pair attracted my attention with their whistling notes, a few days later Pittas were much in evidence in some scrub jungle close by the bungalow.

245. *Pitta cucullata*, Hart. [935].—The Green-breasted Pitta. Rare resident at foot of hills in North Lakhimpur; Dejoo, single record for adult, 24-5-07, ♀, taken on nest containing four eggs; the latter smashed owing to falling timber when clearing the forest.

Dejoo, 11-8-04, ♀ juv., occurs also at Margherita. Failed to meet with it in the plains. Iris dark brown ; orbits plumbeous ; bill black ; tarsus fleshy plumbeous.

246. *Serilophus rubropygia* (Hodgs.) [943].—Hodgson's Broadbill.

Resident, though possibly local migratory, occurs throughout the plains in evergreen forest and well wooded cultivated tracts, generally in small parties. It would be no difficult matter to decimate a party of these Broadbills as they are loathe to be dispersed when fired at, even at close range ; they have a sweet whistling call.

Margherita, November ; Rungagora, February, March ; Dejoo, December; Seajuli, November ; Dhoolohat, October ; North Lakhimpur, July, August.

247. *Psarisomus dalhousiæ* (Jameson.) [944].—The Long-tailed Broadbill.

Resident, it keeps to the dense forests in pairs at the breeding season, gregarious in parties to the extent of a dozen or more in the cold season when it frequents any open scrub growth or land interspersed with trees in the vicinity of habitations, then extremely familiar, very partial to bamboo " baris " or jungle interspersed with bamboos.

Joyhing, 20-9-08, a large party flew into the verandah porch of the Doctor's bungalow. Such an incident is not a particularly uncommon occurrence. Reported on other occasions similar such cases.

Dejoo, 4-1-09, a party noted at early morning : the jerking of their tails was most noticeable. Silonibari, 31-8-11, a small party, four to six birds, parents and young ? attracted my attention with their plaintive whistling ; 21-10-11, in evidence about now, noted in the garden ; a few days previously also seen in scrub growth along trolley line.

Rungagora, April ; Dejoo, December, January, February, (July, August, immatures). Iris light stone brown ; orbits yellow ; bill green ; tip of upper and lower mandible light blue, lower mandible orange-yellow ; tarsus pale green, claws horny.

248. *Picus striolatus*, Blyth. [948].—The Little Scaly-bellied Woodpecker.
Gecinus striolatus, Blanford, F.B.I., Vol. iii., p. 20.

Resident on the " north bank," right bank of the Bramapootra at all events in the wide expanse of open grass and reed land adjacent to the main rivers interspersed with Simul trees (*Bombax malabaricum*). Komolabari, 1-13-9-04, ♂ ; Boduti, 1-11-07, ♂.*

As might naturally be expected in a heavily forested region the wood peckers are well represented and by no fewer than ten species irrespective of the two Piculets.

249. *Picus occipitalis* Vig. [950].—The Black-naped Green Woodpecker.
Gecinus occipitalis, Blanford, F.B.I., Vol. iii., p. 22.

Plentifully distributed throughout the whole district.

250. *Picus chlorolophus chlorolophus*, Vieill. [951].—The Small Himalayan Yellow-naped Woodpecker.
Gecinus chlorolophus, Blanford, F.B.I., Vol. ii., p. 23.

Commonly distributed, more partial to the open tracts of country.

251. *Chrysophlegma flavinucha* (Gould.) [955].—The Large Yellow-naped Woodpecker.

Locally distributed throughout the whole district. Oates' numerous genera in this family, *Picidæ*, are retained though so much sub-division is probably quite unnecessary.

252. *Gecinulus grantia* (McClell.) [958].—The Northern Pale-headed Woodpecker.

H. S., Photo.

GURRUNG JAN, FOREST STREAM OFF R. DIBRU, RUNGAGORA, DIBRUGARH.
Haunts of *Asarcornis scutulata*, &c., &c.

H. S., Photo.

SUBANSIRI "CHURS," HESSAMARA, LAKHIMPUR.
Haunts of *Laticilla cinerascens*, *Oreicola jerdoni*, *Saxicola leucura*, *Asio flammeus*, *Acrocephalus agricola*, &c., &c.

Locally distributed. In the Dibrugarh district specimens secured at Limbuguri, Bozaltoli; Tinsukia, in bamboo jungle. Failed to meet with it in North Lakhimpur.

Iris brown; bill whitish-blue; orbital skin grey; tarsus plumbeous green; claws bluish-horny.

253. *Dryobates macei macei* (Vieill.) [967].—The Fulvous-breasted Pied Woodpecker.

Dendrocopus macii, Blanford, F.B.I., Vol. iii., p. 39.

The Common Pied Woodpecker in all descriptions of forest and open wooded country.

254. *Pyrrhopicus pyrrhotis* (Hodgs.) [978].—The Red-eared Bay Woodpecker.

Locally distributed in the plains. Rungagora, 10-1-04, ♀, secured, one of a small party. Observed in the vicinity of Beni; Abor-Miri hills, North Frontier.

255. *Micropternus phaioceps phaioceps*, Blyth. [983].—The Northern Rufous Woodpecker.

Plentifully distributed throughout the whole district.

256. *Chrysocolaptes gutticristatus* (Tickell.) [992].—Tickell's Golden-backed Woodpecker.

Commonly occurs in all well forested areas.

The vivid colours of this handsome woodpecker are particularly noticeable when in flight across any open space in the forest and its loud harsh call further attracts attention.

257. *Hemilophus pulverulentus* (Temm.) [996].—The Great Slaty Woodpecker.

Only locally distributed in the plains, Rungagora, forest right bank of Dibru R. More plentiful in the heavy forest of the foot hills in North Lakhimpur, occasionally occurs in small parties of six to eight or thereabouts.

♀. Iris dark brown; bill bluish-white; black on culmen and tip of both mandibles; orbits plumbeous; tarsus bluish-plumbeous; claws horny.

258. *Picumnus innominatus innominatus*, Burton. [1001].—The Speckled Piculet.

Occurs throughout the plains although not as plentiful as *S. ochracea*.

259. *Sasia ochracea*, Hodgs. [1002].—The Rufous Piculet.

Similar distribution as *P. i. innominatus*, equally suited in reeds, bamboo, secondary scrub and dense swampy forest.

260. *Iynx torquilla japonica*, Bp. [1003].—The Eastern Wryneck.

Iynx torquilla, Blanford, F.B.I., Vol. iii., p. 78.

A cold season migrant. The below records constitute the earliest arrivals and the latest departures, numerous records intervening dates during the cold weather months. Frequently flushed from off the ground in low open scrub or land under tea cultivation, unobtrusive in its habits and does not shun observation. Earliest arrivals—Dejoo, North Lakhimpur, 7-9-08*, 9-9-08*, 11-9-08, ♂., 17-9-07*; Silonibari, N. Lakhimpur, 14-9-11*; foraging on ground, seen two days previously, only to-day was able to make certain of identification; Komolabari, Sibsagar, 20-9-04, ♀; Rungagora Dibrugarh, 5-10-02, ♀, 20-10-03, ♂, probably earlier arrivals overlooked. Latest departures—Dejoo, North Lakhimpur, 18-4-08, ♂ ♀*, male only

secured; Rungagora, Dibrugarh, 10-4-02, 27-3-02, ♂, 27-3-03, ♀; Dejoo, North Lakhimpur, 15-3-09 *.

261. *Megalæma marshallorum marshallorum*, Swinh. [1006].—The Great Himalayan Barbet.

Restricted to the hill regions. The Daphla, Abor-Miri Hills and Naga hills above Margherita.

Derpai, base of hills, entrance to Subansiri Gorge, 20-11-05, ♀, this specimen was watched by Mr. Lindsay Alexander and seen to be molested and eventually killed by crows during the day. An examination on dissection showed a dislocated neck. This incident was no doubt prompted by similar jealousies after the manner that crows peck an invalid or injured member of their fraternity to death or otherwise take at a disadvantage some unoffending stranger, with this exception unknown at the foot of the hills in North Lakhimpur. Beni, Abor-Miri hills, 7-2-06, observed in parties of a dozen or thereabouts.

262. *Thereiceryx lineatus lineatus* (Vieill.) [1009].—The Lineated Barbet.

Generally distributed throughout the plains.

263. *Cyanops asiaticus asiaticus* (Lath). [—1012]. The Blue-throated Barbet.

Common throughout the plains. Dejoo River, upper reaches, 5-4-07; procured a specimen with nape back and breast splashed with red.

264. *Cyanops cyanotis* (Blyth). [1016].—The Blue-eared Barbet.

North Lakhimpur, approximate distance five miles from base of hills, 3-6-04, ♂, 25-6-04, ♂; otherwise no other records available. More evidence as to the status of this Barbet in Upper Assam is desirable.

265. *Cyanops franklini franklini* (Blyth). [1017].—The Golden-throated Barbet.

A series collected on the north frontier in the Abor-Miri hills where it was comparatively numerous.

266. *Xantholæma hæmatocephalus hæmatocephalus* (P. L. S. Mull.) [1019].—The Crimson-breasted Barbet.

Plentiful in the plains on the grass lands sparsely interspersed with trees, chiefly Simal (*Bombax malabaricum*), absent from the heavy forests.

Maijan, Dibrugarh; Komolabari, Sibsagar: north bank of the Brahmapootra, Dejoo, 8-3-10*; Silonibari, 4-8-11*. These two latter records are somewhat doubtful as no specimens were secured. In any case it must be a rare bird at the foot of the hills in North Lakhimpur. Observed at Tezpur, Lower Assam, in February.

267. *Coracias affinis*, McClelland. [1023].—The Burmese Roller.

Commonly distributed throughout the plains. A familiar object to the most casual observer. Often to be seen hawking for winged termites when they emerge at evening in company with Drongos and Bulbuls, such an occasion noted at Dejoo, 5-12-10.

268. *Eurystomus orientalis calonyx*, Sharpe. [1025].—The Broad-billed Roller.

Eurystomus orientalis, Blanford, F. B. I., Vol. iii., p. 107.

Locally distributed throughout the plains, more partial to the heavily forested tracts than *Coracias affinis*, and plentiful at the base of the hills. Margherita, North Lakhimpur, Guijan to Digiltarung (Plains), Dibrugarh.

269. *Merops orientalis birmanus*, Neum. [1026].—The Burmese Bee-eater.

Merops viridis, Blanford, F. B. I., Vol. iii., p. 110.

Essentially restricted to the grass lands in the plains interspersed with patches of light forest or scattered trees. Dinjan to Panitola, Dibrugarh 20-12-03, ♀ ; Komolabari, Sibsagar, 1-15-9-04, a series collected.

270. *Merops philippinus philippinus*, L. [1027].—Blue-tailed Bee-eater.

Occurs throughout the plains though migratory and locally distributed.

Rungagora (Plains) five miles below on R. Dibru, 16-3-03*, hawking for food at evening dusk , Rungagora, Dibrugarh, 6-4-02* ; Maijan (Plains), Dibrugarh, April 1901 ; Rungagora (Plains), Dibrugarh, 6-7-03, ♂ ; Dejoo (Base of hills), North Lakhimpur, 3-6-10*, several noted in the "hoolahs" in a quarter of the garden a day or so before the burst of the south-west monsoon ; Dejoo, 26-6-08. Dhoolohat, 2-7-11, possibly noticed some few days previously although no note made at the time ; Dejoo, 5-7-04, ♀, 13-7-04, ♂ ♀, 16-7-04, ♂, ♂ juv., 8-7-10*, in some numbers in the "hoolahs" in garden, 4-9-08, ♀ ; Silonibari, 4-9-11, still in evidence and again on 17-9-11 adults noted ; 30-9-11, wet weather at the time ; Dejoo, 17-10-04, ♂ ad. ♂ ad. ; Silonibari, 18-10-11, single ; Dejoo, 23-10-10, numbers congregated in the light scrub growth on the left bank of the Dejoo R. near the Runganuddie at the Mukh enlivening the air with their whistling and gyrations. Is this preparatory to migration ? Bipuria, Bodutird, 31-10-10, numbers congregated in the grass lands at dusk ; all appearances point to a migration ; Bipuria, 7-11-10, about seventy estimated in one party in grass lands hereabouts.

From the above records it appears this Bee-eater gradually recedes from the forest regions to the open grass country in the plains towards the cold season as I have no dates available for the terai for November and onwards until their arrival the following year in June or July. Undoubtedly nests in North Lakhimpur specimens procured in July lack the elongate middle pair of tail-feathers and are birds of the year.

271. *Melittophagus swinhoei* (Hume.) [1030].—The Chestnut-headed Bee-eater.

Evidently a migrant and locally distributed, occurs in North Lakhimpur generally in pairs, never abundant, records noted at commencement and termination of rainy season.

Khakoi R., North Lakhimpur, 21-3-05, ♀ ; Dejoo, about 20-4-03* ; Dejoo (Hinni, Jan.), 3-6-10*, a day or so before burst of monsoon ; 27-6-08*, a pair in forest (Rajghur) ; 14-9-08*, a pair ; 17-10-04, ♂.

272. *Nyctiornis athertoni* (Jard. and Selby.) [1031].—The Blue-bearded Bee-eater.

Resident along the tract of country at the base of the foot hills. Rare in the plains. Rungagora, 18-11-01, single record ; Margherita, December, January, February, March ; Dejoo, January, July, 29-8-08, a Bee-eater which had hung around my bungalow, close to a *jan* or stream to-day was hawking for food within a few feet of my window taking repose in a small tree close at hand, familiar to a degree. Dejoo R. higher reaches, (Daphla hills low elevations), 18-12-04, ♂.

273. *Ceryle rudis leucomelanura*, Reichenb. [1033].—The Indian Pied Kingfisher.

Ceryle varia, Blanford, F. B. I., Vol. iii., p. 119.

This Pied Kingfisher is a familiar object on all the rivers in the plains.

Many such a little episode as the following may be seen any day preparatory to the nesting period, frequently at such times three birds may be seen in company, probably two males vieing for a female. Rungagora, R. Dibru, 12-1-02. To-day I was a witness of some evolutions of a pair of Kingfishers. A seated bird perched on a reed parallel to the water

was subjected to repeated buffetings by another bird which made incessant oblique darts through the air. First on one side and then from the opposite side, coming as near to the stationary bird as possible, causing the latter to reverse its position with each change of direction of its assailant: the exuberance of its spirits was manifest with a rapid flapping of its wings although no noise was audible with the exception of the usual sharp pipe.

274. *Ceryle lugubris guttulata*, Stejn. [1034].—The Himalayan Pied Kingfisher.

Ceryle lugubris, Blanford, F. B. I., Vol. iii., p. 121.

Confined to the rivers around the head of the valley, occurs at low elevations to the limit of the fast flowing water as it enters the plains. Very wary and difficult to procure ; each pair of birds if more than one pair haunt the same river have their allotted beat.

Joyhing R., Dejoo R., Panchnoi R., Kola Pani; Dholong R., Khakoi R., Runganuddie and Subansiri in North Lakhimpur.

275. *Alcedo ispida bengalensis*, Gm. [1035].—The Indian Common Kingfisher.

Alcedo ispida, Blanford, F. B. I., Vol. iii., p. 122.

Generally distributed throughout the plains, occurs along the banks of forest rivers and streams, although more plentiful in the more open parts of country. A large series secured in the vicinity of Komolabari, Sibsagar, can be picked out at a glance from specimens from the forest tracts by their pale coloration.

276. *Alcedo beavani beavani*, Wald. [1036].—Beavan's Kingfisher.

Plentifully distributed throughout the plains.

Eggs taken 19-6-04 at Dejoo.

277. *Alcedo grandis*, Blyth. [1038].—Blyth's Kingfisher.

Occurs in North Lakhimpur at the foot of the hills in the gullies and deeply shaded fast flowing streams, restricted to a very few miles beat.

Panchnoi, Daphla hills (low elevations), 22-11-05, ♂, 23-11-05, ♂, 24-11-05, ♀ ; Dejoo R., 11-12-04, ♂, ♂ ; 1-1-05, ♂ ; Khakoi, R., 21-3-05, ♂, strangely enough only one female secured.

It has an arrowy flight and in consequence is very difficult to procure on the wing and when at rest settles in the dense vegetation well out of observation. Iris brown ; bill black, red at gape, lower mandible in female palehorny orange-red ; tarsus pale coral red ; claws reddish-horny, middle claw darkest.

278. *Ceyx tridactyla* (Pall.) [1040].—The Indian Three-toed Kingfisher.

Rare in the plains. One seen Paropara Jan., R. Dibru, cold season 1902.

Dinjan, 28-4-01, ♂, killed against tea house window. In North Lakhimpur is more in evidence at the commencement of the rainy season and onwards. Apparently somewhat migratory as no cold season records are available.

Dejoo, April and May 1910, noted on numerous occasions as it flashed past uttering its sharp note ; 9-5-07, nest in "teelah" a few feet from ground level in dense forest ; 10-5-07, another nesting site inside hollow tree stump in same forest

Dejoo, several specimens procured, June (11-6-04, ♀), July and August (6-8-04, ♂); Silonibari, 27-4-11 ♂, 4-5-11 ♂, 22-5-11 ♂.

279. *Rhamphalcyon gurial* (Pearson) sub. sp. ? (1043).—The Brown-headed Stork-billed Kingfisher.

Pelargopsis gurial, Blanford, F. B. I., Vol. iii, p. 129.

Generally distributed throughout the plains on "bhils" or forest streams "jans", R. Dangari, Digiltarung, Gurrung Jan, Rungagora; Bhimpoora bhil, Gogaldhubie.

Dejoo (In North Lakhimpur plentiful), Komolabari.

280. *Halcyon smyrnensis fusca* (Bodd.) [1044].—The White-breasted Kingfisher.

Halcyon smyrnensis, Blanford, F. B. I., Vol. iii., p. 132.

Plentifully distributed throughout the plains.

281. *Halcyon pileata* (Bodd.) [1045].—The Black-capped Kingfisher.

Dejoo, North Lakhimpur, 7-4-04. Recorded, Journal, B. N. H. Socy., Vol. xvi., p. 154. It has not occurred since. As this Kingfisher occurs in Upper Burma, the inference to be drawn is that its appearance ought to take place more frequently than it actually has done as it appears to be addicted at performing sporadic movements.

282. *Halcyon coromanda coromanda* (Lath.) [1046].—The Ruddy Kingfisher.

Callialcyon lilacina, Blanford, F. B. I., Vol. iii., p 134.

Sparingly distributed throughout the plains.

Rungagora, 7-8-02, a specimen brought in alive which had been caught in the Dinjan tea-house; several captures of Kingfishers reported to me from the same quarter and under similar conditions.

Dejoo (base of hills), North Lakhimpur. Forest clearance, 10-6-07, ♂, one of a pair which had a nest containing young about fifty feet above the ground in a huge Poma tree (*Chickrasia tabularis*). At the time I was not aware that this was a breeding bird as the remaining bird was unable to repel the buffetings of some Paroquets, *Palæornis fasciatus*; the nest was eventually deserted owing to these miscreants dislodging the young birds.

283. *Dichoceros bicornis* (L.) [1051].—The Great Hornbill.

Occurs throughout the plains, more plentiful at the foot hills, a denizen of lofty forest trees and in consequence difficult to secure. The noise made by these birds is daily produced in an almost exact representation by the "paniwallah" as he returns with his tins of water balanced on his "sangra" to the cook house, an operation which has misled me to believe these Hornbills were passing overhead on not a few occasions, 26-2-09*.

Dejoo to Silonibari forest, fourteen *D. bichornis* in two relays, ten in front and four behind, making for the forest.

Dejoo, 22-4-08*, this morning I came suddenly on three pairs in some huge trees adjacent to the seed nurseries, they bounded up and along the thick branches with rapid though ungainly hops, some were within gunshot before taking flight.

♂. Iris crimson-red; bill: upper mandible gamboge yellow merging towards tip into orange-red, lower mandible pale horny yellow merging towards tip into yellow; upper surface of casque orange-red; basal half of culmen and front black; base of lower mandible black; orbital skin and tarsus dark olive; claws horny. ♀. Iris pearly white.

284. *Anthracoceros albirostris affinis* (Hutton) [1053, part].—The Large Pied Hornbill.

Anthracoceros albirostris, Blanford, F. B. I., Vol. iii., p. 145.

The Common Hornbill of the plains. Occasionally seen on the ground in forest, disturbed several of a small party partaking of the over ripe berries that had fallen. Drepai, 26-1-06.

♂. Iris reddish-brown; tarsus greenish-plumbeous.

285. *Rhytidoceros undulatus undulatus* (Shaw.) [1054].—The Malayan Wreathed Hornbill.

Very uncommon in the plains at all events around Rungagora, though I have seen odd single birds in the forest between the Dibru and the Bramapootra in the cold season.

Dejoo, North Lakhimpur, 30-3-10, at this time numerous pairs crossing and recrossing the garden at early morning and most noticeable generally.

Silonibari, June 1911, not a day passes without some seen overhead, singles, pairs and small parties. Silonibari, 6-8-11, to-day whilst observing one of these hornbills pass overhead I was struck by the absence of noise which is invariably accompanied with their laboured flight. It was raining at the time with a very dense atmosphere. Would this fact not be accounted for by the damp state of the bird's plumage, the feathers of the under wing coverts deadening the noise? They generally keep well out of gunshot range, it sometimes happens that hey cross at a lower altitude than usual, if they see any person in their course they strike out in another direction as soon as they realise there may be danger as I have witnessed. Not much in evidence in the cold season, possibly sedentarys Specimens secured around Dejoo, June, July, August, September (juvenis). ♂. Iris reddish-brown; orbital skin reddish-purple; gular skin chrome-yellow; bill pale greenish-horny, at base purplish red; tarsus greenish black; claws black; tranverse band across gular skin black.

286. *Ptilolæmus austeni* (Jerdon) [1060].—Godwin-Austen's Hornbill.

Confined to the forest around Margherita, probably best treated as a sub-species of *tickelli*. The generic names in general use for the Hornbills have been retained but are in need of revision.

287. *Upupa epops saturata*, Lönnberg. [1066.]
Upupa epops, Blanford, F. B. I., Vol. iii.

Irregular cold season migrant, numerous records for cold season months, the following dates constitute the earliest arrivals and latest departures:—

Dejoo, 2-9-10 *, not in evidence some days later probably due to an unexpected spell of hot weather. Rungagora, 17-9-01, ♂*♀, female only secured, a pair observed a few days previously although date not recorded at the time.

Silonibari, 16-9-11, ♂ ♀*; on the 23-9-11 at 5·30 a.m., there were five Hoopoes in company under the window of my room unconcernedly foraging in the sandy soil of the compound with evident success.

Dejoo, 19-9-08* ; Rungara, 25-4-01; Joyhing, 24-4-10*; Dejoo, 12-4-10*; Rungagora, 8-4-02, ♂ ♀?*, 8-5-02*; Silonibari, 24-4-11, ♂ ♀*; a pair observed on 17-4-11, possibly same birds. One bird caught and released 20-4-11, its feathers sodden with rain.

288. *Upupa epops indica*, Reich. [1067].—The Indian Hoopoe.
Upupa indica, Blanford, F. B. I., Vol. iii., p. 161.

Reported occurrence of a Hoopoe during "*the rains*" had often been mentioned, but no specimens forthcoming, it was only on the arrival of this visitor that I was able to satisfy myself a resident bird did occur; the secured specimen settling this point without doubt.

Silonibari, North Lakhimpur, 6-8-11, ♂, first seen on 30-7-11; 30-9-11*, there was a fine adult under my bungalow window this morning in company with a bird of the typical form: the latter seemed to be the master of the situation to its annoyance; it was on one of these occasions when I had the opportunity of seeing its crest expanded, there was the decided richer tone of the rusty colour compared with *U. epops saturata*, the white wing bars also exhibited a more pronounced rufous tinge. A dirty wet day previous and heavy rain last night.

289. *Apus affinis affinis*, Gray. [1073].—The Common Indian Swift.
Cypselus affinis, Blanford, F. B. I., Vol. iii., p. 168.

Specimens collected. Joyhing, 12-2-05, ♂,♂, agree with East Nepal birds. Length of wing, 5·4″ and 5·2″, outer retrices ·2 longer than middle pair and are referable more to the typical form, trusting to these measurements than to *A. a. subfurcatus*. Some records of Large Swifts seen as follows may have been *A. pacifus*. Rungagora, 1-6-02, single bird hawking for insects at evening over the Dibru R. in company with Sand Martins. I noticed a peculiar flapping of the wings on flight and the marked difference between the length of primaries and secondaries. It passed repeatedly within a few feet of my head and constantly was dipping into the water.

Dejoo, common, July and August. Rajghur, 27-8-10, numbers hawking within gunshot range, bright morning, heavy rain clouds over the hills.

Dejoo, 19-4-07*; Silonibari, 2-9-11.* Two large Swifts flying fairly high during heavy rain, low temperature, several seen also on 25-9-11*.

290. *Tachornis batassiensis batassiensis* (Gray) [1075].—The Palm Swift.

Rungagora, 16-1-02*, 9-4-03, ♂; Dejoo, 1-1-05, ♀, 2—4-7-04, 3 ♂ ♂.

These Swifts attach their nests to the large overhanging leaves of the Toko Palm (*Livistona jenkinsiana*) in compounds, very frequently almost within hand reach. Other favourite positions are the projecting eaves of the thatched roofs of the bungalows. The Rungagora bungalow was in much request in this respect. At evening they sally out in quest of food with lively twitterings and arrowy flight.

291. *Collocalia unicolor fuciphaga* (Thunb.) [1082].—The Himalayan Swiftlet.
Collocalia brevirostris, Blanford, F. B. I., Vol. iii., p. 177.

Dejoo, North Lakhimpur, 4-3-10, several procured during a dull afternoon, numbers were hawking for food at high and low altitudes.

292. *Caprimulgus macrourus ambiguus*, Hart. [1093, part].
Caprimulgus macrurus, Blanford, F. B. I., Vol. iii., p. 188.

Rungagora, 8-11-01, 3 ♀ ♀ ; Dejoo, 21-7-07, ♂ ; 12-9-08, ♂ ; 24-6-10, ♀ juv.; 5-11-08, ♂, shot at 12-30 p.m. midnight in the centre of the clean trodden path which had its alignment past my bungalow at full moon, almost as daylight.

Rungagora, September 1902, one night during this month whilst near Kamptigwali on my walk home from Dinjan a nightjar alighted on one of the fence posts, on the high road allowing me to approach within two arms' lengths before taking flight. Quite a common occurrence to have them flying about the bungalow compound after sunset. I have seen them dash under the verandah porch, very frequently alight a few paces in front of one on the path and as one strolls along flap leisurely to another position a few paces farther away, again to be disturbed and act in a similar manner.

293. *Caprimulgus indicus indicus*, Latham. [1095.]—The Jungle Nightjar.

Dejoo, 12-2-05, ♂, single record only.

Lyncornis cerriniceps possibly has been overlooked. I have a note against this Nightjar. First weeks in September, Dejoo, North Lakhimpur; but as no specimens were secured this record lacks substantiation.

294. *Batrachostomus hodgsoni hodgsoni* (G. R. Gray) [1097.]—Hodgson's Frogmouth.

Dejoo, North Lakhimpur, 1-1-05, ♀. This bird was brought in alive from the hills by Daphlas.

Iris pale stone ; bill brownish-pink, tip dark ; tarsus similar coloured to bill ; claws dark. Stomach contained small coleoptera sp.? remains.

295. *Harpactes erythrocephalus* (Gould) [1101.]—The Red-headed Trogon.
Resident: Extremely plentiful in the plains in forest tracts.
Margherita, January, February, March, December ; Rungagora, December, January, March ; Dejoo, July, August ; Beni, Abor-Miri hills, February.

296. *Cuculus canorus telephonus*, Heine. [1104, part].—The Eastern Common Cuckoo.
Cuculus canorus, Blanford, F. B. I., Vol. iii., p. 205.
Personally I have never heard this bird call in North Lakhimpur although undoubtedly authentic reports of rare occurrence however have reached me. The following records refer to immature birds which strange to say have been much more in evidence in my experience than adults. Dejoo, 9-04, ♂ ; 5-9-08 ♂, 30-8-08, 15-9-04, ♂, ♀; 23-10-04, ♀; Rungagora, 14-4-01, adult, 8-10-03, juv;. Silonibari, 8-5-11*; 15-8-11*, adult single ; 8-9-11*, single immature at close quarters attracted my attention whilst it demolished some larva.

297. *Cuculus micropterus micropterus* Gould. [1107].—The Indian Cuckoo.
Dejoo, North Lakhimpur, 30-7-08, ♂, juv.; 10-4-10*, first time heard calling this year at west corner of garden ; Silonibari, 10-4-11, first time heard calling this year. They continued to call up to 16-5-11 again, heard on the following dates :—20, 22 and 29-5-11, latter date in morning, 25-6-11, 13-7-11, and 23-8-11, these two last dates must be unusually late.
In North Lakhimpur announces its arrival in April with its melodious call, towards the end of June there is a lull and the bird is not much in evidence, silent more or less at egg laying time, seldom seen as it has a decided preference for the thick scrub growth on the forest outskirts.

298. *Cuculus sparverioïdes*, Vig. [1108]—The Large Hawk-Cuckoo.
Hierococcyx sparverioides, Blanford, F. B. I., Vol. iii., p. 211.
Occasionally occurs throughout the plains and sparingly at the foot of the hills in North Lakhimpur.
Dinjan, Dibrugarh, 4-1-02, ♂ ; Panitola, Dejoo, 17-9-07, ♀ ; Dejoo, 3-3-09*, partial to thick secondary growth, chiefly feeds on larvæ and grubs. ♂ ad. Iris dark yellow ; bill greenish-horny, upper mandible dark; gape and orbits light yellow ; tarsus bright yellow ; claws light horny. ♀ juv. Iris pale stone brown ; orbits greenish ; gape yellow ; bill, upper mandible dusky black, lower mandible greenish-yellow ; tarsus dark ochreous yellow.

299. *Cuculus fugax nisicolor*, Blyth, [1110.]—Hodgson's Hawk-Cuckoo.
Hierococcyx nisicolor, Blanford, F. B. I., Vol. iii., p. 214.
One record only. Dejoo, North Lakhimpur, 16-6-04, ♀, probably overlooked.

300. *Cacomantis merulinus querulus*, Heine. [1113].—The Rufus-bellied Cuckoo.
Cacomantis merulinus, Blanford, F. B. I., Vol. iii., p. 218.
Dhoolohat, North Lakhimpur, 20-3-09*; Dejoo, 23-2-11*, calling after rain; 26-3-10*, uttering the first two or three notes incessantly both throughout the day and at night; a day or so elapsed before its full vocal powers were attained ; rain previously.
Nalkatta Rd., North Lakhimpur, 2-4-10, 10-30 p.m., several whistling at full pitch, but one only able to emit hoarse notes at each endeavour ; 9-4-10*, I heard evidently this same bird in the identical quarter on the following Saturday, very little perfected in its call.

Rungagora, 11-4-03, ♂, 2-8-03, ♂ juv., 27-10-03, ♂ juv., 24-1-02*, at roadside.

Dejoo, 15-4-07, ♂ ad., 17-4-07, ♂ ad., 21-4-07, ♂, ♀ juv., 27-5-07, ♂ ad., 28-11-10, ♀, 26-8-10*, corner tree close by bungalow, as silent nowadays as it is noisy at the mating season.

Dejoo, 24-11-08, on this unusual date I heard the first few notes of this Cuckoo at early morn and located an adult bird in the Fish-Tail Palm (*Caryota urens*, L.) at the entrance to the compound.

Evidently resident. Only occasionally calls at the beginning of July, equally at home during a dry moonlight night, the drenching downpours of the blackest night or midday, heat nothing seems to damp its ardour as it pours forth its monotonous notes, which fall in the scale with the precision of tonic solfa modulations.

♂ adult. Iris venetian red; sometimes with a whitish outer ring; orbital skin yellowish-dusky or lobster red; gape and inside mouth salmon red or lobster red; bill blackish-dusky horn, base of lower mandible reddish; tarsus yellowish-ochreous; claws horny black. ♀ immature. Iris dull brown; bill dark horny with a blotch of dusky on lower mandible; tarsus dull yellow; claws black horny.

301. *Penthoceryx sonneratii* (Lath.) [1114].—The Banded Bay Cuckoo.

Dejoo, North Lakhimpur, a series secured as follows:—27-8-08, ♂ ad.; 20-8-08, ad.; 26-8-08, ♀; 13-9-07, ♀ juv. ♀ juv.; 6-9-08, ad. observed; 21-8-08, adult.

Dejoo, 1908, this Cuckoo has somehow replaced *C. merulinus* this season, numerous young birds in immature dress in evidence, whereas last season the former bird was the most plentiful. No further data to report. I fail to account for this most unusual appearance, making due allowance for the bird having been overlooked although a look out was kept in future years no more evidence came to hand.

302. *Chrysococcyx maculatus* (Gm.) [1116].—The Violet Cuckoo.

Dejoo, North Lakhimpur, first secured, 4-6-04, ♂; 20-4-07, two pairs, one male secured; 26-7-07, ♀*, in Poma tree near Rungagora lines.

Silonibari, 17-9-11, ♀*, which I failed to secure, its rosy head first attracted my notice, also its method of feeding, evidently occupied demolishing a larva or some grub.

♂, 4-6-04. Iris red-brown; orbital skin red; bill orange yellow at base and gape red, tip dusky; tarsi olivaceous purple.

♂, 20-4-07. Iris red brown; orbital skin and gape waxy red; bill yellow, tip dusky; tarsi olive green, stomach contained remains of Coleoptera sp.? These Cuckoos kept up a sweet twittering in the overhanging trees along trolley line and were exceedingly tame.

303. *Surniculus lugubris dicruroides* (Horsf.) [1117].—Drongo Cuckoo

Surniculus lugubris, Blanford, F. B. I., Vol. iii., p. 223.

Dejoo, North Lakhimpur, 20-4-03, ♂, secured in dense evergreen forest foot of hills, almost impenetrable undergrowth.

Dejoo, 15-4-07, ♂; 16-6-04, ♀ ♀; 26-3-10, noted for the first time calling this year, heard again a few days later; Bipuria, 10-4-11, in some numbers along the road to North Lakhimpur.

Silonibari, 17-9-11, still in evidence, I shot one of a pair although failed to secure it as a mass of creepers a great height up the trunk of the tree prevented it falling to the ground, silent at this time of the year. Its call resembles the syllables whistled as "phew" "phew" "phuit" in an ascendant scale.

Iris brown; bill black; tarsus plumbeous; soles similar pale plumbeous.

304. *Coccystes jacobinus* (Bodd.) [1118].—The Pied-crested Cuckoo.

Dejoo, North Lakhimpur, 25-9-10, a single immature bird in change of plumage, secured in some low-lying ground. Failed to meet with it before or since this date.

305. *Coccystes coromandus* (L.) [1119].—The Red-winged Crested Cuckoo.

Rungagora, 15-10-03, ♀; Dejoo, Rajghur, 20-4-07, pair.*

As a rule keeps to the dense undergrowth, in consequence seldom seen and difficult to arrive at its true status in the district.

306. *Eudynamis orientalis honoratus* (L.) (1120).—The Indian Koel.

Eudynamis honoratus, Blanford, F. B. I., Vol. iii., p. 228.

Migratory in Upper Assam, evidently resident in Bengal as noisy anyway in this latter province in January as it is on arrival in Assam and during the later rainy months, possibly on migration extends up to the head of the valley in the plains before spreading out towards the hills as my dates around Dibrugarh denote earlier arrivals than in North Lakhimpur although fifty odd miles farther up the valley.

Polasbari, Bengal, 25-3-09, calling; Goalundo, Bengal, 17-1-11, calling; Rungagora, 30-3-03*, first arrivals, 4-4-02*; Silonibari, 10-4-11*, calling; North Lakhimpur (station), 16-4-10*.

Dejoo, 9-5-07, first heard this year; 26-5-05, ♂; Komolabari, 1—13-9-04, ♀; Dejoo, 14-9-08, a young Koel flew overhead followed by some crows, *C. splendens* and settled in a tree behind the bungalow to which the crows came on and fed it; the Koel making a feeble attempt at cawing.

307. *Rhopodytes tristis tristis* (Less.) [1123]—The Large Green-billed Malkoha.

Resident throughout the plains, particularly plentiful at the base of the hills. Generally found in thick secondary growth, although several of my specimens have been obtained at some heights from the ground, but in these cases the heavy creepers and parasitic growths on the trees gave the birds the incentive to forage for food, they hop on and about the creepers with occasional flicks of their long graceful tails.

Rungagora, November, December, March; Dejoo, January, March, June, specmins secured these months. Iris brown; orbital skin and cere dirty crimson; bill light emerald green; tarsus plumbeous green; claws dark horny.

308. *Centropus sinensis sinensis* (Steph.) [1130].—The Common Coucal.

Common throughout the plains. A denizen of scrub and secondary growth.

309. *Centropus bengalensis* (Gm.) [1133].—The Lesser Coucal.

Throughout the plains. In North Lakhimpur possibly more plentiful than *C. sinensis* under the hills where it frequents similar haunts although in the plains this is essentially a grass land coucal as noted around Rungagora.

310. *Palæornis torquatus* (Bodd.) [1138].—The Rose-ringed Paroquet.

Plentifully distributed throughout the plains. Immense flocks of Paroquets darken the air at times during the cold weather when on the wing. Their arrowy flight and harsh chattering call is familiar to the most unobservant. Their presence however when at rest unless located on the naked branches of decayed trees is by no means easy to detect as the green plumage assimilates with the dense foliage of the evergreen forest.

311. *Palæornis cyanocephalus rosa* (Bodd.) [1140].—The Eastern Blossom-headed Paroquet.

Palæornis rosa, Blanford, F. B. I., Vol. iii., p. 252.

Plentiful in North Lakhimpur at base of the hills.
Specimens collected during June, July, August, evidently resident.

312. *Palæornis schisticeps finschi,* Hume. [1142].—The Burmese Slaty-headed Paroquet.
Palæornis finschi, Blanford, F. B. I., Vol. iii., p. 254.
Occurs around the north-eastern corner of the Valley, Margherita, and extends into the plains as far as Panitola. (Chota Tingrai, Tinsukia.) 14-2-04, ♀.

313. *Palæornis fasciatus* (J. L. S. Müller). [1145]—Red-breasted Paroquet.
Commonly distributed throughout the plains.

314. *Loriculus vernalis vernalis* (Sparrm.) [1150].—The Indian Loriquet.
A single ♀, 3-6-04, secured some few miles south of Dejoo, North Lakhimpur, and a pair seen on the Bodutti Rd. near the station of North Lakhimpur in the cold weather 1906, constitutes the total available evidence.
♀. Iris pale naples yellow, bill and cere orange yellow; upper mandible reddish-orange; tarsus orange; claws horny.

315. *Phodilus badia badia* (Horsf.) [1154].—The Bay Owl.
Photodilus badius, Blanford, F. B. I., Vol. iii., p. 268.
Occurs sparingly in the plains. Dibrugarh, 19-11-04, ♂, two records for North Lakhimpur only; Pathalipam, Dejoo, 17-11-08, ♂.

316. *Asio flammeus flammeus* (Pontoppidan.) [1157].—The Short-eared Owl.
Asio accipitrinus, Blanford, F. B. I., Vol. iii., p. 271.
Hessamara (Subansiri churs), 31-12-05, ♂, secured in bright sunlight about 10 a. m. after having been flushed several times from the scanty scattered clumps of grass growing hereabouts on the sandy "churs". Until this specimen was actually in my hand I took it for *Tyto* (*Strix*) *candida* which undoubtedly occurs in Upper Assam though I have failed to secure it through lack of opportunity to work the grass lands more thoroughly and to the best advantage.

317. *Strix indrani newarensis,* Hodgs. [1160].—The Himalayan Brown Wood-Owl.
Syrnium indrani, Blanford, F. B. I., Vol. iii., p. 275.
Silonibari, latter days in April 1911, a youngster was taken out of a huge hollow tree which was felled at the forest clearance. A rigorous search failed to locate another. The adult parents were seen several times afterwards in the vicinity of their home. This bird was kept alive and in December had almost assumed the adult plumage noted at the time as a gradual change, not by a month as in *Huhua nepalensis.* The dark irides and its large size misled me into thinking that the specimen was no other than *H. nepalensis.* This fact combined with the dangerous policy of taking things for granted might have ended this interesting record as the bird in the careless hands of others died during my absence and the skin was not preserved; it was only when I was in camp on the Nepal frontier that I secured a young *Huhua nepalensis,* that the thought immediately crossed my mind that the former bird was no other than *S. indrani newarensis*; as this Owl keeps to the almost impenetrable virgin evergreen forests at the base of the hills in North Lakhimpur it is small wonder it had escaped my notice for such a long period.

318. *Ketupa zeylonensis zeylonensis* (Gm.) [1164].—The Brown Fish-Owl.
Plentiful in all well-watered localities, nocturnal, yet in the dense forest tracts interspersed with sluggish streams "jans" emerging from the "bhils"

may be seen at day time roosting in the dense foliage on the alert, Gurrung Jan, R. Dibru, 26-1-02*. R. Dibru, cold season 1903, sex ? Panitola, 17-3-02, ♂; Silonibari, 24-4-10, ♀. *Ketupa flavipes* may occur in the hill rivers; this Owl is the largest of the genus, in colour a rich tawny, until actual specimens have been secured. It is impossible to say definitely. *K. zeylonensis* reaches the base of the hills in North Lakhimpur at all events. Fish Owls observed April 1907. R. Dejoo*., Subansiri Gorge, January 1905,* possibly were *K. flavipes.*

319. *Ketupa ketupa* (Horsf). [1166].—The Malay Fish-Owl.
Ketupa javanensis, Blanford, F. B. I., Vol. iii., p. 283.

Common in the forest streams which emerge into the Dibru.

Rungagora, 16-3-02, ♂. Cold season 1903 sex. ?, 31-1-04, ♀; Dejoo, North Lakhimpur, 5-3-11, ♀. A Malay species, in allprobability generally distributed throughout the plains in Upper Assam. Iris bright gamboge yellow; cere light green; bill bluish-horn dark on culmen; tarsus bluish-fleshy; claws dark horny.

320. *Huhua nipalensis* (Hodgs.) [1170].—The Forest Eagle-Owl.

An adult procured at Derpai in broad daylight after it had made an attack on some fowls, by Mr. Lindsay Alexander, September 1907.

16-4-08, a solitary breast feather picked up in new clearance, Rajghur, Dejoo.

14-10-07*, whilst coming through a "Putti" forest track on my return from Silonibari to Dejoo on the high land, one of these Eagle Owls allowed the elephant to approach right underneath the branch of a tall tree on which it was resting affording a truly impressive sight of this large handsome Owl. This would be about 4 p.m. in good light. It was in no hurry to take flight either and winged its way on doing so very leisurely; the dark irides were very prominent. As this Owl has a similar habitat to *Syrnium indrani newarensis* it is a most difficult matter to obtain specimens and as it cannot be numerous if indeed it is not actually rare very little information is forthcoming of its status in the district.

321. *Otus spilocephalus* (Blyth.). [1175].—The Spotted Himalayan Scops Owl.
Scops spilocephalus, Blanford, F. B. I., Vol.iii., p. 295.

Occurs on both sides of the valley at the foot hills.

Margherita, January, February, March; Dejoo, February, March.

Joyhing, 9-2-09, a shot specimen received in flesh in an emaciated condition covered with parasites. A previous example found dead in the Gorge of the Runganuddie, some distance farther up than this specimen seems to show the prevalence of some disease amongst these owls.

Iris pale yellow; bill and tarsus dull horny pink.

322. *Otus bakkamœna lettia* (Hodgs.) [1178].—The Himalayan Collared Scops Owl.
Scops bakkamœna, Blanford, F. B. I., Vol. iii., p. 297.

Rungagora, 18-2-02, ♀; Margherita, 17-1-03, ♀.

The status of *O. giu* and this species is very imperfectly known owing to insufficient data. Occurs. On the plains, failed to get any specimens in North Lakhimpur where *O. spilocephalus* is the prevalent form. One record, Dejoo, 24-11-07*, lacks substantiation. The Scops Owls have a preference for the verandah railings of one's bungalow much to the consternation of the servants who regard their visit as unlucky and their presence as an ill omen.

323. *Athene brama brama* (Temm.) [1180].—The Spotted Owlet.

Confined to the more open tracts of country. Specimens secured at

Maijan near Dibrugarh. April 1901, records from no other localities. Possibly overlooked, although my own personal impression is that Upper Assam is the extreme limit of its range in one direction.

324. *Glaucidium cuculoides cuculoides* (Vig.) [1183].—The Large Barred Owlet.

Commonly distributed throughout the whole area.

Margherita, December, January, February ; Rungagora, December, March, August ; Dejoo, January, August, juv. Its habit of perching in exposed positions and its flights in broad daylight sometimes leads to its destruction by large accipitrine foragers.

325. *Glaucidium brodiei brodiei* (Burton) [1186].—The Collared Pigmy Owl.

Occurs in the plains though not plentiful. Panitola, Hessamara, 25-2-08,* along roadside roosting in the reeds at mid-day ; 8-1-06, ♀, Margherita, February, March.

326. *Ninox scutulata burmanica,* Hume. [1187, part].—The Burmese Brown Hawk Owl.

Ninox scutulata, Blanford, F. B. I., Vol. iii., p. 309.

Generally distributed throughout the plains, invariably found in forest in the vicinity of water. Gurrung, Jan., R. Dibru, 21-1-02, ♂ ; R. Dibru, Digiltarung, cold season 1903, ♂ ; 26-1-02, ♀ ; Dejoo, 27-8-08, ♂ Juv.

327. *Pandion haliaëtus haliaëtus* (L.) [1189].—The Osprey.

R. Dibru, 5 miles below Rungagora, 9-3-02, ♂. The river at this locality forms eddies of fast flowing water, an unusual trait for this sluggish river and was choked with snags.

Gogaldhubie, Bhimpoora bhil, 15-1-05, ♀ ; Hessamara, Subansiri, 8-1-06, ♂ ; Nagaghoolie, Dibrugarh, cold season 1901, a pair had taken up their quarters in a bhil near at hand, and appeared quite at home on a forest covered patch of land in the centre of the bhil. It only required a slight stretch of the imagination to bring to one's memory their island homes on Loch Arkaig and Loch an Eilean and picture the similarity. Dejoo, 19-9-08*, flying high ; Joyhing, Runganuddie, 4-6-10,* rather an unusual date, a single Osprey passed overhead as I crossed the river, taking a swerve when right over head ; Dejoo, 10-10-10*, I noted an Osprey hovering over a small jan in the garden this morning, it was possibly intending to settle with a view to demolish a fish that it held in its talons, the arrival of a king vulture (*Otogyps calvus*) resulted in its hurried departure when it gave utterance to some squealing notes. It was quickly lost to view as it made off in the direction of the Runganuddie.

328. *Otogyps calvus* (Scop.) [1191].—The Black Vulture.

Generally distributed in the plains although only odd birds and pairs mixed up with the common vultures are usually seen at work demolishing decaying carcases.

Rungagora, 5-3-02. Iris pale yellow ochre ; tarsi pinkish-yellow.

329. *Gyps tenuirostris,* Hodgs. [1195].—The Himalayan Long-billed Vulture.

The common vulture in the plains. These vultures often choose at Dejoo some Fish-tail Palms (*Caryota urens*, L.) to congregate after a heavy gorge. As these trees stand at the entrance to the compound, one has to give them a wide berth as the droppings come down in small showers.

330. *Pseudogyps bengalensis* (Gmel.) [1196].—The Indian White-backed Vulture.

Occurs in North Lakhimpur fairly frequently; one secured at Dejoo, 21-8-05, ♀. It requires no slight exercise of one's will power even if blessed with a strong stomach to tackle the preservation of any vulture, in particular if the thermometer is registering a high reading. The amount of persuasion exercised and baksheesh promised for native assistance makes it also a thankless task and some time has to elapse before the skin is presentable for the cabinet.

331. *Ictinaëtus malayensis,* (Reinw). [1210].—The Black Eagle.

Occurs at all events in the lower ranges of the hills on the north frontier, but unknown even at the base of the hills or in the plains. A pair observed beating over a bare ridge in the vicinity of Beni, Abor-Miri country in February 1906 during a particular wet and cold month. In the Sikkim hills it is about the least shy of all the larger accipitrine birds and is by no means restricted to forest as it may often be noted leisurely foraging over the sparsely wooded gullies and cultivated slopes, almost invariably in pairs.

332. *Spizaëtus nipalensis* (Hodgs.) [1213].—Hodgson's Hawk-Eagle.

Chota Tingrai, Tinsukia (Plains), 15-2-04*, Dejoo, North Lakhimpur (base of hills), left bank Runganuddie, 30-11-08, ♂; Silonibari, North Lakhimpur, 7-6-11.* Both in morning and in the afternoon I had a good view of this fine Eagle; breast feathers heavily blotched. A pair of crows (*C. macrorhynchus*) kept it in close attendance to its evident annoyance.

These records constitute the whole data available. It also occurs around Margherita. Dr. Falkiner had a live specimen at Panitola for several years obtained when a youngster from this latter locality.

333. *Spilornis cheela rutherfordi*, Swinh. [1217].—The Burmese Crested Serpent-Eagle.

Spilornis cheela, Blanford, F. B. I., Vol. iii., p. 357.

Common throughout the plains, a familiar object of bird life in the landscape, not confined to any particular class of country excepting deep forest, appears almost oblivious to its surroundings when seated on a tree stump or naked branches of an isolated tree.

Rungagora, 9-3-02, ♀, in very pale, almost white plumage; R. Dibru, Rungagora, 16-3-03, ♂, in normal dark plumage; North Lakhimpur, 8-8-04, ♀, in normal dark plumage; Derpai, 16-3-06, ♀, in normal dark plumage; Dejoo, 14-8-08, ♂, throat pure white; breast white faintly streaked with dark centre lines; abdomen pale; crown and nape white, each feather with a dark bar. Dejoo, 2-10-08, ♂, in normal dark plumage; 11-08 sex? very pale plumage; breast white almost devoid of markings; crown, nape and throat white streaked in places.

Dejoo, 31-8-08, ♂; 18-9-08, ♀, 2-10-08, ♀; 15-10-08, ♂; 31-10-08, ♀; all in normal dark plumage.

334. *Butastur teesa* (Franklin)? [1220].—The White-eyed Buzzard-Eagle.

These two records undoubtedly refer to a Buzzard-Eagle as no specimens have been secured: the species cannot be determined beyond all doubt. I have been mistaken on many occasions in being led to believe immature specimens of *Haliastur indus* were *Butastur* sp. until the bird was actually in my hand.

Dejoo, 8-10-10*, 12-5-08*, similar to a Kestrel in its movements though more laboured, eventually soared up to a great altitude and was lost to view.

335. *Haliaëtus leucorypha* (Pall.) [1223].—Pallas's Fishing-Eagle.

The common Eagle on the banks of all the large rivers, the Bramapootra in particular and on various large sheets of water "bhils" throughout the

plains. Birds in all stages of plumage make it somewhat difficult to discriminate though the white band across the middle of the tail is a sure means of identification in adult plumage. On several occasions seen to attempt to seize Duck and other water birds.

336. *Polioaëtus ichthyaëtus* (Horsf.) [1226].—The Large Grey-headed Fishing Eagle.

Generally distributed throughout the plains in all well-watered localities. Joyhing, Runganuddie; Dejoo, Runganuddie, 15-8-08, ♀; 16-9-08, ♂; Gogaldhubie, Bhimpoora bhil, 8-12-05, ♂; 16-12-05, ♂; Komolabari, Bramapootra; Rungagora, R. Dibru, 29-12-01, ♀; 14-2-04, ♀. Immature birds are liable to be confused with the previous species until actually in the hand for comparison.

337. *Polioaëtus humilis major*, Meyr and Wigl. [1227].—Fishing Eagle.
Polioaëtus humilis, Blanford, F. B. I., Vol. iii., p. 371.

By no means as plentiful as *P. ichthyaëtus*, occurs on the Dibru. Rungagora, 28-11-03, ♀.

338. *Haliastur indus indus* (Bodd.) [1228].—The Brahminy Kite.

Unequally distributed in the plains. In some localities rarely seen and only at certain periods, partial to haunts in the vicinity of water.

Bhimpoora bhil, Gogaldhubie, 8-12-05, ♀ (512); 19-12-05, ♀ (511); 20-12-05, ♂ (4547); Hessamara, 10-4-05, ♂ (513); North Lakhimpur, 15-6-04, ♀ (455); Dejoo, 15-9-08, ♀ (833); 31-10-08, ♂ (468); 11-08 sex ? (408); 13-11-08, ♀ (3290).

No. 455. First plumage. Iris dark hazel; bill bluish-black; tarsi dull olive yellow; claws black.

No. 833. First plumage. Iris pale brown; tarsi greenish-yellow; claws black.

Nos. 408 and 511. Immature plumage second stage. These specimens on the back in places show the ruddy tinge of the adult; head and breast uniform pale sandy red with faint centre stripes.

No. 513. Adult. Iris stone brown; bill green and bluish-horny; cere yellow: orbital skin and gape greenish-yellow; tarsi dull yellow; claws black. A great relief to the Miris of the "gaon" adjacent to which this bird had taken up its site was its dispatch and heralded with much shouting as it had taken a heavy toll of their fowls.

339. *Milvus melanotis*, Temm. and Schleg. [1230].—The Large Indian Kite.

Commonly distributed throughout the plains, apparently replaces M. govinda in Upper Assam.

Dejoo, April 1903, a small party located in the bamboos, heavy rain at this time; Rungagora, 8-12-03, ♀; 10-12-03, ♀; 15-12-03, ♀; Gogaldhubie, 7-12-05, ♀; North Lakhimpur, 21-11-05, ♂; Dejoo, 25-9-08, ♀; 14-9-08*, a pair in the vicinity of bungalow first appearance this cold season; 23-9-10 I noted three this afternoon; they appeared to have come up the valley with the advent of heavy rain; the next morning were in evidence roosting in a large tree about a hundred yards from bungalow; Silonibari, 9-9-11* and on 11-10-11,* four to six birds seen.

At times during the rains they have been reported to congregate in vast numbers although I have no personal observations on this point. I have seen them probing for earth worms in parties of six to eight individuals on cleared ground after rain. All the above records are cold season data, apparently absent at other periods of the year.

340. *Elanus caeruleus* (Desf.) [1232].—The Black-winged Kite.

Komolabari, Sibsagar, 1—13-9-04, ♂; Hessamara, Subansiri, 9-4-05, ♀; 28-12-05, ♀; 29-12-05, ♂.

Sissi to Bordeobam, North Lakhimpur, 24-2-08*, noted on two occasions in "pothar" and grass lands.

Dejoo, 25-6-08*, an immature bird; breast tinged with fulvous. Again seen on 27-6-08* which possibly was the same bird.

North Lakhimpur, 9-1-09*, in flight over polo ground.

Pohumara, North Lakhimpur, 11-11-10*, three to four miles south on Bodutti road hovering gracefully over "pothar" land. Its efforts at hovering may not be as perfect or sustained as the Kestrel, yet this Kite is a most interesting and beautiful addition to the landscape.

Silonibari, 11-4-11*, a pair; 6-5-11*, 19-8-11*, a splendid bird preening its feathers whilst perched on a stake in a portion of the garden allowed me to approach within a very few yards; there was a strong breeze blowing and as it rose it soared up to a considerable elevation; the sun threw its white tail feathers into prominence a fine sight heightened by the atmospheric conditions; the heavy black clouds which enveloped the hills gave warning of the close proximity of a thunderstorm. Silonibari, 8-9-11*, a single bird probably immature.

This Kite is essentially restricted to the vast expanses of grass along the sandy banks of the rivers. The above notes of its occurrence at various times at the base of the hills are therefore of interest.

341. *Circus macrourus* (Gm.) [1233].—The Pale Harrier.

Circus macrurus, Blanford, F. B. I., Vol. iii., p. 381.

Dejoo, North Lakhimpur, 14-2-09, ♀; 23-4-07, ♀*; 27-4-08, ♀*; 3—4-5-10, ♀*.

These three records in April and May probably refer to this Harrier, if not, certainly *C. cyaneus*, as no specimens were secured it is impossible to say to what species they refer with absolute certainty as identification of these Harriers on the wing is a difficult matter.

Colouration of soft parts in female. Iris deep brown; cere greenish; bill blue black; tarsus pale yellow; claws bluish-black.

342. *Circus cyaneus* (L.) [1235].—The Hen-Harrier.

Dejoo, 15-9-08, ♀*; 26-10-08, ♀*; 13-11-10, ♀*; 9-1-09, ♀*; Rungagora, Dibrugarh, 24-1-04, ♀; 26-1-04, ♂; Dejoo, 14-11-09, ♀; Pathalipam, North Lakhimpur, 2-3-09, ♂; Kamptigwali, Dibrugarh, 7-3-04, ♂; Dejoo, 7-3-09, ♀; North Lakhimpur, station limits, 16-4-10, ♀*; Rungagora, Dibrugarh, 23-4-02, ♀*; Silonibari, 29-4-11, ♀*; Dejoo, North Lakhimpur, 26-10-08. I came across a female at work dispatching the remains of a Hoopoe on my rounds this morning.

Dejoo, 7-2-09. I noted two females beating the ground in a most systematic manner, almost impossible for anything to escape as they had both taken their positions at different heights, the one following also in the wake of the other.

Dejoo, 9-2-09, Hen Harriers, females at all events are to be seen hovering over the tea and also occasionally engaging in bouts of combat as next day I noted two with another hawk careering in hot pursuit after each other.

Colouration of soft parts in adult male: Iris golden yellow; in immature male, iris pale yellow; cere bluish-yellow; bill dark horn; tarsus dull yellow ochreous; claws black. In one adult female, iris bright yellow; cere and eyelids similar; bill horny black; gape greenish-yellow; tarsus orange yellow; claws black. Another adult female: iris stone brown; cere greenish; bill blue black; tarsus deep yellow; claws bluish-black, and a female also has the iris light stone brown; cere and orbital ring yellow with a green tinge; tarsus pale yellow ochre.

The advent of these Harriers: the adult males in their pure white and grey plumage with a rapid graceful flight as they beat the ground in search of food is a charming sight and as true harbingers of the eagerly desired cold weather are always welcome. The presence of these marauders is duly announced by Bulbuls and Mynahs who create a general commotion and quickly betake themselves to any light jungle affording a retreat when they survey the flight of their dreaded enemy from the tops should they pass at a safe distance. A near approach and they drop into the inner denser foliage. There appears to be no lack of food to supply their wants judging by the numbers which visit the plains during the cold season. Hoopoes fall an easy prey and pay a heavy toll in consequence.

Dejoo, North Lakhimpur, 15-2-09, Harriers evidently have certain chosen spots when disposing of their captures. I noted this day the red feathers of the male Minivet (*Pericrocotus brevirostris*), tail feathers of Bulbuls (*Otocompsa emeria*), (*Molpastes bengalensis*) and Trogon (*Harpactes erythrocephalus*) at one such place. *Circus cyanens* is apparently the common species. There is no reason why *C. pygargus* (L.), Montagu's Harrier, should not occur although I have failed to get any specimens.

343. *Circus melanoleucus* (Forst.) [1236].—The Pied Harrier.

Bodutti, North Lakhimpur, 13-1-11, ♂ *, passed me at a remarkably close range, so intent was it quartering the ground in search of food. North Lakhimpur, station limits, 20-3-09, ♂ *, beating over the Polo Ground. Harmutty, North Lakhimpur (base of hills), 22-3-09, ♂ *.

North Lakhimpur, station limits, 7-4-08, ♂ *, frequenting the open ground by the cutcherry.

Dejoo, North Lakhimpur, 20-7-08, ♂ *, passed overhead flying in the direction of Harmutty over the heavy forest at the base of the hills, quite out of its usual habitat.

Silonibari, 31-7-11, ♀ *, a beautiful adult manœuvring at the top end of the garden identified by its small size and dark plumage. A dirty afternoon, a heavy shower fell shortly afterwards.

Dejoo, 24-9-10, ♂ *, undoubtedly on arrival from higher elevations, morning very wet, north wind blowing, observed beating over the garden.

Silonibari, 3-10-11, ♀ *; presumably this species seen again 9-10-11.

Dejoo, 11-10-10, ♀ *, very dark bird, 25-11-07, ♂ *; 25-12-10, ♂ *.

More addicted to wide open expanses of grass lands, although it may be seen beating over damp marshy ground, seldom seen in the forest tracts at the base of the hills. The above records are thus deemed worthy of note. Resident: yet it can only be regarded thus in a partial manner as it is undoubtedly most plentiful in the cold weather months.

344. *Circus æruginosus* (L.) [1237].—The Marsh Harrier.

Bhimpoora bhil, Gogaldhubie.

7-12-05, ♂, crown and throat rufous with a few dark streaks; mantle somewhat light, other rest of plumage dark brown. Wing 16·25″.

9-12-05, ♂, crown rufous with dark markings; mantle and breast rufous mixed with dark blotchings. Wing 16″.

Iris stone brown; cere bluish-yellow; bill horny black; tarsus dingy yellow; claws black.

20-12-05, ♂, crown rufous with a few light streaks; throat and breast white mixed with heavy brown blotchings, mantle somewhat rufous. Wing 17·75″.

6-12-05, ♀, crown dull yellowish-white feathers abraded; throat similar; breast somewhat rufous otherwise in dark plumage; mantle slightly blotched rufous. Wing 17″.

Iris dark brown; cere pale yellowish; bill black horn, bluish at base; tarsus dirty yellow; claws black.

8-12-05, ♀, crown rufous streaked; throat rufous; upper breast some light blotches otherwise in dark plumage. Wing 16·5″.

12-12-05, ♀, crown and nape dull yellowish-white feather abraded; throat similar; breast blotched with brown and white, remainder of plumage dark. Wing 16″. The sexes are practically identical in size. Locally distributed owing to its propensity for well watered tracts. A common bird in some of the large "bhils" in North Lakhimpur.

345. *Buteo ferox* (S. G. Gmel.) [1239].—The Long-legged Buzzard.

Dejoo, North Lakhimpur, molested by two Jungle Crows and driven out of the trees near the Tea house jan, at the time put down as *Pernis cristatus*. Secured on 29-11-10 and proved to be a ♂. Wing 16·5″, length 21″. Iris warm stone grey; cere greenish-yellow; gape yellow; bill black, bluish towards base; tarsus olivaceous yellow; claws black. This specimen is remarkably pale but agrees with a similar example from Afghanistan in my collection. This locality is considerably east of its range as given by Blanford. (Sikkim).

346. *Accipiter badius poliopsis* (Hume.) [1244, part.].—The Burmese Shikra.

Astur badius, Blanford, F. B. I., Vol. iii., p. 398.

Rungagora, 4-7-03, ♂ ad. (149); Komolabari, 1—13-9-04, ♂ ad. (135).

Dejoo, 23-7-04, ♂ juv. (140); 2—3-5-10 *; 2-8-04, ♀ juv. (141); 5-8-04, ♂ juv. (139); 15-9-08, ♀ ad. (828); 10-8-07, ♂ juv. (151); 21-10-08, ♀ ad. (827).

No. 149. Shot with a Sparrow (*Passer montanus*) in its talons which it had taken out of a tree a few yards from the bungalow at mid-day.

This series shows all the characteristics in plumage from the immature stage to adult. ♂ ad., No. 140, iris crimson; ♂ immature, No. 151, iris pale yellow.

347. *Lophospizias trivirgatus rufitinctus* (McClell.) [1246, part].—The Large Crested Goshawk.

Lophospizias trivirgatus, Blanford, F. B. I., Vol. iii., p. 401.

Rungagora, 29-12-01, ♂ juv. (195), very pale specimen, sparsely blotched on breast; Dejoo, 25-4-03, ♂ ad. (159), iris golden-yellow; 24-7-04, ♂ juv. (198); 12-9-08, ♂ juv. (201); 8-1-11, ♂ ad. (3541); Derpai, 27-1-06, ♂ ad. (156).

No. 195. Iris light yellow; cere and orbital ring yellow; bill: lower mandible blue black, upper mandible black; tarsus dull yellow; claws blackish-horn.

No. 156. Iris orange; cere and gape greenish yellow; orbital skin yellow; bill black; tarsi dark yellow; claws black.

No. 3541. Iris deep gamboge: cere greenish-yellow; orbital skin and gape greenish-yellow; bill bluish at tip, base black, lower mandible pale bluish; tarsus ochreous yellow; claws black.

This series shows all the characteristics in plumage from the immature stage to adult. Somewhat unusual that no females have been secured.

Beni, Abor-Miri hills, 5-2-06*, as we were about to pitch our camp in some forest adjacent to the "changs" we disturbed this hawk in possession of a partridge *Arboricola rufigularis* which it had almost picked bare and dropped at our approach.

348. *Accipiter nisus nisosimilis* (Tickell) [1247, part].

Accipiter nisus, Blanford, F. B. I., Vol. iii., p. 402.

Rungagora, Dibrugarh, 6-4-03, ♂, No. 137, immature in abraded plumage; 26-1-04, ♂, No. 136, immature; 28-2-04, ♂, No. 4548, immature; Dejoo, North Lakhimpur, 2-12-10, ♂, No. 3473, adult.

As all these specimens were of a very pale phase in plumage and suspected of being referable to some eastern form, I submitted this small series along with a supposed *A. nisus melanoschistus* from the Nepal-Sikkim Frontier to Dr. Hartert who kindly promised me a report on them when dealing with the Sparrow Hawks for his "Palæarctic Birds." Under cover of a letter, 17-2-14, while stating that the latter bird is undoubtedly *melanoschistus*. No. 3473 belongs to the race "*nisosimilis*." The adults of these two forms are very distinct but it is not always possible to distinguish the young birds only *melanoschistus* would occur in the summer while *nisosimilis* would be by far the commoner bird in winter. I am of the opinion that both the young males from Rungagora, Dibrugarh, are "*A. n. nisosimilis* and not *melanoschistus*."

Note.—No. 3473. Wing 8·5″, iris gamboge yellow ; cere greenish-yellow ; bill horny black, at base blue; tarsus deep ochreous yellow; claws black.

This Sparrow Hawk had its quarters in the vicinity of the bungalow and was shot with a sparrow in its talons which it had taken out from the verandah at evening.

No females secured, *Accipiter affinis*, Gurney, and possibly other eastern forms as *Accipiter virgatus confusus*, Hart., may occur. No specimens of these two Sparrow Hawks have however been obtained.

349. *Accipiter gularis* (Temm. and Schleg.) [1248, part.]—Sparrow-Hawk.

Rungagora, Dibrugarh, 7-4-01, ♂, No. 134, in adult plumage ; iris golden yellow ; cere pale lemon yellow ; bill leaden grey, black at tip ; tarsus yellow.

Dr. Hartert identified this specimen as this species. Blanford makes *gularis* a synonym of *virgatus*. Hartert treats it for the present as a good species though it might be a sub-species of *A. virgatus* but not of *A. affinis*.

350. *Pernis cristatus elliotti*, Jerdon. [1249].—Crested Honey-Buzzard.

Pernis cristatus, Blanford, F. B. I., Vol. iii., p. 406.

Rungagora, 15-4-01 ♀ (19), Mokalbari (Dibrugarh), Dejoo, 12-4-08, ♂ (16); 15-8-08, ♀ (18); 2-10-08, ♀ (17).

No. 19. Iris golden yellow; bill blackish-horn; gape and base of lower mandible bluish tinge; tarsus dull yellow.

Nape and head extremely light and rufous; the breast suffused with a ruddy tinge especially the under tail coverts, striæ almost obsolete except on upper breast. Wing 17″.

No. 16. Iris red brown; bill, dark horn upper mandible, bluish-dark horn lower mandible; tarsus dull yellow ochreous; claws dark, stomach and gape contained remains of insects, flies and honeycomb, wing 15·5″, very dark plumage ; upper breast without any white markings.

No. 17. Wing 16″. Breast and abdomen crossed with white markings and heavily blotched.

No. 18. Iris golden yellow in somewhat similar plumage to No. 16, though somewhat abraded and white markings more in evidence. This bird had hung about in the vicinity of the Factory buildings for some days previously, it had been shot at on the Saturday previously, heavy forest a few miles away, yet these Buzzards seem very partial to the vicinity of habitations.

Dejoo, 12-10-07,* a pair beating over the grass lands in Rungagora, portion of garden.

Dhoolohat-Silonibari, 29-1-10,* a fine adult bird at rest in tree on road side.

Dejoo, 3-5-10,* a single bird beating over the Rajghur, cold, wet day 11-10-10,* a single noted.

Silonibari, 14-6-11, one flew overhead into the "Bansbari" on the Dhoolohat road.

Equally distributed throughout the plains. The above data exhausts all the available evidence as to its status.

351. *Baza lophotes* (Temm.) [1251].—The Black-crested Baza.

Rungagora, 25-8-02, forest path beyond Wattijan in the direction of Digiltarung. I had a splendid view of three of these Bazas as they passed overhead from and to the trees on each side of the track. I again saw them on a future occasion some distance in the forest. This record refers to the only locality where these beautiful birds have come under my notice.

352. *Baza jerdoni* (Blyth.) [1252].—Blyth's Baza.

Dejoo (Rajgur forest), North Lakhimpur, 15-9-07, ♀.

Total length 17·7″; wing 12″; tail 8·5″; bill 1·2″, tarsus 1·5″.

Iris pale golden yellow; cere and base of lower mandible pale bluish; bill horny black; gape dull bluish; tarsus china white; claws dark blackish-horny; stomach contained remains of vivid green insects, Mantids, Blattids, Coleoptera sp.? and a large green larva of a Sphingid sp.? Insect remains were found in gullet also.

This specimen agrees fairly closely with the description of immature birds in Blanford, otherwise the median gular stripe is present and a white bar on the tail below the coverts.

Dejoo, 2-2-09*, observed a pair of accipitrive birds in recently felled forest clearance, their flight was an alternate rapid beating of the wings and then a gliding movement in a direct line with motionless outstretched wings. In size about *Lophospizias trivirgatus* but showing a patch of white on the rump or upper tail coverts, they eventually settled on some high trees surrounding the clearance. I have every reason to believe these birds to be this species.

Silonibari, 8-6-11, bright sunny morning, an accipitrive bird soaring in circles with an occasional rapid beating of the wings, white patch on rump, very prominent; the locality was in heavy forest, seen from a clearance as the bird made these movements over the tops of the trees.

353. *Falco peregrinus calidus*, Lath [1254, part].— ?

Falco peregrinus, Blanford, F.B.I., Vol. iii., p. 413.

Peregrines have been seen on several occasions at Rangagora and Lilabari in particular, it was quite impossible to identify them on the wing owing to their rapid flight. A single bird seen at rest on the branch of a huge tree at the foot of the hills at Dejoo on 4-5-08 was no doubt referable to the true Peregrine and also a pair of birds which had their headquarters in a Poma tree (*Chickrasia tabularis*) at the ghaut Dejoo in the cold weather of 1904-5; these birds used to sally out over the river at morning, but failed to put in an appearance the next cold season: one seen crossing the polo ground, North Lakhimpur, 9-1-09.

Falco peregrinator Sundev. Probably occurs, until specimens are actually secured, no satisfactory solution is possible of its existence.

354. *Falco severus* Horsf. [1261.]—The Indian Hobby.

Derpai, North Lakhimpur, 13-1-06, ♀ ad. (177): 15-1-08, ♀ immature (826); 6-8-08, ♂ immature (825).

Other records from Derpai, Panitola, Rungagora where these Falcons used to frequent some lofty trees adjacent to the Post Office.

Dejoo, 16-12-04*, a pair noted in high tree in Rajghur; 3-9-08*, a rather light coloured specimen; 5-9-08*, a single bird hawking at evening over the Factory buildings; 13-8-08*, observed in clearance located on a tree the

Peregrine was wont to frequent; 27-10-08*, a male passed overhead low down but travelling at a great speed; 30-10-08, this evening I saw a Hobby snatch up a small bat when on the wing and as it flew around took repeated digs with its beak at it whilst held in its talons, after some time had elapsed it took its departure with every indication of finishing its repast at leisure.

Dejoo, 12-2-09*, a pair frequenting the naked branches of the lofty trees surrounding the nurseries, completely secure out of gun shot range.

Dhoolohat, 4-6-11*, at evening a single bird dashed past the bungalow. These records constitute the sum total of occurrences.

355. *Falco vespertinus amurensis*, Radde. [1262].—The Eastern Red-legged Falcon.

Erythropus amurensis, Blanford, F.B.I., Vol. iii., p. 424.

Dejoo, North Lakhimpur, 27-10-08, four of these lovely Falcons seen hawking around the lofty trees surrounding the nurseries on the Rajghur, eventually settled on the naked branches of a high tree when three of them afforded me a truly grand view as they were busily engaged preening their feathers in the bright sunlight. Next day they had disappeared. This Falcon noted on 3-5-10, Dejoo, soaring over Rungagora portion of garden cold wet day, certainly not. *F. severus* but as the specimen was not secured this record is uncertain.

356. *Falco tinnunculus tinnunculus* L. [1265].—The Common Kestrel.

Dejoo, 25-9-08*, hovering over a portion of garden, dull and windy afternoon; 26-9-07*, first appearance noted this cold weather; 27-9-10*, a pair hovering afforded a particularly fine sight; Silonibari, 8-10-11*, another observation recorded for 10-10-11, possibly the same bird or pair of birds; Dejoo, 18-10-10*, hawking with Rollers this evening for food; ♂ ♀, 1-11-08; ♂ ♂, 21-11-05; ♂, 14-12-04; Rungagora, Dibrugarh (Plains,) ♀, 30-1-04.

Dinjan, Dibrugarh, ♀, 7-4-01; Silonibari, 11-4-11*, a pair observed; Dejoo, ♂, 7-4-03, 19-4-10*; located in a small tree from which it was sallying out in search of food, a bright morning, 25-4-10*; Silonibari, 27—29-4-11, a single bird which had its quarters hereabouts, I noted it settle on the tea; Dejoo, 3-5-10*, hovering over a portion of the garden, a miserable day, cold and wet with harsh wind coming in gusts from the north; 5-5-10*, a single bird observed in another locality from that of the previous record although it might have been the same bird; 9-5-07*, two pairs still about.

Silonibari, 28-7-11*; Dejoo, 2-8-08*, noted as a most unusual occurrence; 27-8-10*, circling over a portion of the garden about 3-30, hot afternoon.

357. *Falco tinnunculus saturatus* (Blyth)? [1265, part].—The Indian Kestrel.

Falco tinnunculus, Blanford, F. B. I., Vol. iii., p. 428.

The last three records above almost certainly point to the resident bird, *Falco tinnunculus saturatus*, Blyth, but as no specimens have been secured from May to October it is only conjecture though the above July and August dates are significant.

All my specimens evidently are the typical form.

I have to thank Dr. Hartert for checking my identification of the above series of secured specimens.

358. *Microhierax melanoleucus* (Blyth.) [1268].—The White-legged Falconet.

Resident: Occurs frequently around Margherita and occasionally in North Lakhimpur.

Joyhing, 12-9-05*, whilst driving past some coolie lines, perched on a

small tree adjacent to the road side a beautiful male Falconet was occupied demolishing the remains of a Sparrow. Never in all my experience did I ever recollect such a case of absolute fearlessness as it was perched only a few feet above my head, even the first attempt to procure it by a youth with his bow and arrow failed to dislodge it and it was only at a second fruitless attempt that it flew off with a sharp shriek and dropped its quarry.

Sabati, Nov. 1905*, a single noted in the bare branches of a tree at garden edge.

Joyhing, 16-4-07*, one flew overhead at evening near the Doctor's bungalow.

Dejoo, 15-2-09*, a pair reported to me by an intelligent native Sirdar as having been seen in the forest jungle surrounding the nurseries.

Silonibari, 13-9-11*, whilst at the woodstack this afternoon I noted numbers of swallows busily engaged hawking for food around the stack. When there was a sudden dart in amongst their numbers, on turning round I noted one of these Falconets carrying away a swallow to an adjacent bare tree stump about fifteen yards from the trolley line, as the top of its quarters could only be about twenty feet from the ground and it was quite unconcerned.

I had an excellent opportunity of studying its methods as it commenced by digging its bill into the head of its victim occasionally preening its own feathers and giving itself a slight shake as it was drizzling rain at the time.

(To be continued.)

PROGRESS OF THE MAMMAL SURVEY.

As was announced in the last number of the Journal, three of the Society's Collectors have left the Survey and gone home to the War. The remaining Collector, Mr. C. A. Crump, alone carries on the work of the Survey and is at present collecting in Sikkim, where he had just gone when the last report was written. He has been working round Gangtok but reported Mammal life to be scarce there, though he was able to secure good series of voles and mouse hares. After collecting round Gangtok he worked north to Chuntang on the Lachen road finding animals much more plentiful and, which is most encouraging, he is securing help from the natives. Between the 10th and 13th December, over 40 specimens of some 16 kinds were collected or brought in. The Sikkim collection will be of very great importance and help in determining, along with that from Kumaon, the numerous species described by Brian Hodgson, many of which are only known by the old and faded types in the British Museum.

We would appeal to members all over the country to assist in keeping the Survey going till the War is over and we can, if possible, get our other collectors back. Much valuable work can be done by sending in specimens from districts already collected in, which were not recorded in the report dealing with that district and a list of which can be sent to anyone. Also by sending in any skins (measured in the case of animals up the size of a hare) with skulls from districts not yet worked. From certain districts topotypes (*i.e.*, specimens collected in the locality where the original type or specimen from which the first description was taken, came from) are very much wanted and a full list of these can be had from the Honorary Secretary. The following may be mentioned as examples of some of the topotypes wanted :—Indian Wolf and Indian Fox from the Deccan, the Sind Hare from Sukkur, the Desert Fox from Rajputana and Salt Range, Jungle Cat from Mussoorie, the Common Mongoose from Kashmir, Leopard Cat from Lower Bengal, Phayre's Leaf Monkey from Arrakan, Horsfield's Flying Squirrels from Rangoon.

For some time the Common Indian Hare has been much wanted from Lower Bengal to enable many of the hares, obtained in the various collections to be properly worked out. Our Collector, Mr. Crump, when in Calcutta in the rains made a short excursion to obtain specimens but was unsuccessful and as he had to go to Sikkim was unable to try again. Now, however, through the kindness of Mr. Laird-MacGregor we have received a specimen of the common hare from near Calcutta, where the specimen from which the original description was made came from. With the help of this specimen various common hares obtained by the Survey will be able to be properly worked out. A *series* of specimens from Lower Bengal is still however much to be desired.

REVIEW.

THE MACROLEPIDOPTERA OF THE WORLD.

EDITED BY

DR. A. SEITZ.

VOL. I.—PALÆARTIC RHOPALOCEPA. VOL. IX.—INDO-AUSTRALIAN RHOPALOCERA (PART) LONDON, WILLIAMS AND NORGATE, 1908-1913.

In 1906 Dr. Adalbert Seitz of Frankfort commenced the heroic task of publishing a comprehensive work on the macrolepidoptera of the world in collaboration with the best known entomologists. His aims were conciseness, a low price, as far as possible a figure of every form and finally rapidity of publication.

The work is divided into two main divisions, *viz.*, Fauna Palæarctica and Exotica. Fauna Exotica is further sub-divided into three sections, *viz.*, Fauna Americana, Indo-Austalica and Africana. Division I and each section of Division II are each being issued in four volumes, *viz.*, *Rhopalocera*, *Sphingidæ* and *Bombycidæ*, *Noctuidæ*, *Geometridæ*. A volume on morphology, etc., is to follow. Thus the work will be completed in 17 volumes, each 13″ × 10″. It is being issued in parts, each part ordinarily containing 8 pages of letterpress and 2 plates; the price per part of Division I is one shilling and of Division II one and six pence. It is stated that Division I and each section of Division II will each contain 100 parts, but this estimate is likely to be exceeded. Students of the macrolepidoptera of India will require the whole of the Fauna Palæarctica (Div. I) and section II, Fauna Indo-Australica of Div. II.

Volume I, Rhopalocera Palæarctica, was commenced in October 1906 and completed in January 1910 in 47 parts. It contains 380 pages of text and 89 plates. The authors are Dr. Seitz for *Papilios*, *Danainæ*, most of the *Satyrinæ*, *Arginnis*, *Melitœa*, *Nemeobidæ* and *Lycœnidæ*; H. Stichel for *Parnassius*, *Morphidæ* and most of the *Nymphalidæ*; J. Rober for the *Pieridæ;* G. Eiffinger for *Erebia;* and P. Mabille for the *Hesperiidæ*.

Of Volume IX., Rhopalocera Indo-Australica, the first number appeared in May 1908, but the second did not follow until two years later. Since then publication has been rapid; 88 parts containing 704 pages of letterpress and 139 plates have been published dealing with the *Papilonidæ*, *Pieridæ*, *Danainæ*, *Satyrinæ*, *Morphinæ* and most of the *Nymphalidæ*. Except for the Papilios, which have been written up by Dr. K. Jordan, the remainder of the work has been dealt with by H. Fruhstorfer.

The "Macrolepidoptera of the World" does not profess to be an exhaustive treatise, but a concise book of reference for all the named species and races and, with the aid of the plates, it affords a rapid means of identification. The general arrangement does not differ from what we are all used to. The race system is, however, elaborated; this is a more rational treatment than that adopted by Moore, Swinhoe, etc., and its further elaboration may be looked for in the future. For ready reference the name of the genus is given at the top of every page and the names of the various species, races, etc., in the margin. Concise descriptions are given of the families, genera, species, etc., and of the earlier stages, were known, the idea being that with so many figures long detailed descriptions are unnecessary. One could have wished for more detail, but this would of course have increased the size of the work. There are no long lists of

references, a familiar feature in most books on insects, nor is much attention paid to synonymy. There is an excellent index at the end of each volume and after each family a list of species, etc., with a reference to the original description. The plates also aim at conciseness and do not profess to be artistically arranged ; the figures are placed as close together as possible, in most instances half the upper and half the underside being depicted ; at the head of each plate is given the name of the genus dealt with and under each figure the name of the form represented. The figures are excellent and compare most favourably with those to be found in the most expensive works on natural history. Owing to the rapidity of publication several errors have crept in, but these are corrected from time to time. The work is being published in German and translated into English and French ; the English translation might perhaps have been better done, as in some cases the meaning is rather obscure.

Mabille's treatment of the Palæarctic *Hesperiidæ* by means of keys to the species in each genus is admirable ; one could have wished that the same method had been adopted for such difficult genera as *Lycæna*, *Erebia*, *Argynnis*, *Melitaea* and *Parnassius*. Jordan's section on the Indo-Australian Papilios is excellent and brings up to date Rothschild and Jordan's monograph on the Papilios of the old world.

Fruhstorfer has split up many of our Indian species into races. Though no doubt he is justified in this course, yet it would have been more convincing, if he had mentioned the extent of the material on which he had based his deductions ; in some cases it would almost appear as if he had not even seen the form to which he has assigned a name. He describes the genitalia of many species and has used this feature to some extent as a basis for classification ; by this means he has cleared up several doubtful points, which have always puzzled entomologists.

It may safely be said that the aims of the author have been fully attained. Having regard to the conditions set forth it is difficult to say how the work could be improved on ; its price is most reasonable and within the means of nearly every collector. We wish it the success that it deserves.

Vol. II.—Palæarctic Bombyces and Sphinges. Vol. X.—Indo-Australian Bombyces and Sphinges. Vol. XI.—Indo-Australian Noctuiform Phalænæ.

Of these volumes only part of Volumes X and XI have been received, but Vol. II is complete in itself both as regards text and plates. This latter volume comprises the Palæarctic Bombyces and Sphinges, of which the former are defined as "all the Heterocera which do not belong to the Sphinges Noctuids, Geometrids and Micros," so that it is perhaps unfortunate that the first family described here called the *Zygænidæ* should really belong to the Microlepidoptera, and the same criticism will apply to the *Psychidæ*, *Cossidæ* (which should be the twenty-sixth family cited, and not the twenty-fifth, as stated) and the *Ægeriidæ*. The term "Bombyces," as indicating any natural group of moths, is obsolete and only reminiscent of the worst traditions of the nineteenth century, and the sooner its use is abandoned, the better. In the present case, for example, the *Zygænidæ* are placed in close proximity to the *Syntomidæ*, with which they have nothing in common except a slight superficial resemblance ; to the expert such a method of arrangement matters little, but the amateur is likely to conclude that proximity in arrangement indicates real affinity, an idea which he will have to unlearn later and perhaps with difficulty.

The sections on separate families are written by various authors and are followed by an alphabetical list of species with references to the original

description of each one. As is inevitable under such a system, the sections are unequal in value, some (such as those on *Zygaenidæ* and *Sphingidæ* by Dr. Karl Jordan) being very well written and others hardly of the same quality. Dr. Seitz himself deals with the *Syntomidæ*, "*Arctiidæ*," *Notodontidæ*, *Megalopygidæ*, *Limacodidæ*, *Heterogynidæ* and *Cossidæ*. He is perhaps an expert on Butterflies but we may be pardoned for suggesting that his views regarding Moths must not always be taken too seriously. His ideas of the limits of the *Arctiadæ*, for example, seem very hazy and will doubtless undergo revision after further study. The student of Indian Moths will note that *Pexinola longirostris* (here placed in the *Nolinæ*) is really a *Meridarchis* and belongs to the *Carposinidæ* (Tortricina). The *Hypsinæ* are here given as a sub-family of the *Arctiadæ*, but it is unfortunate that the only species included should be *Eligma narcissus*, which is really a Noctuid, whilst *Argina* and *Nyctemera*, which are really *Hypsidæ*, are relegated to the "*Micractiinæ*" and *Nyctemerinæ* respectively. The name *Micrarctia* is here published, by the way, as a new generic term, and various new generic and specific names are brought forward in this and other volumes of the work under review; we do not consider that a popular book of this nature is the proper place for the publication of such names.

Dr. Seitz's ideas regarding the limits of species are generous to say the least. He appears to suppose (Vol. II., p. 73) that *Utetheisa pulchelloides* is merely a form of *pulchella*, although it is structurally quite distinct. In Vol. X. also Dr. Jordan unites various species of *Heterosia* (e.g., *magnifica*, *virescens* and *cingala*) which cannot be regarded as conspecific in the usual sense of the word "species."

Misprints are unavoidable in a book of this nature, but they are usually obvious. A curious word, however, is "chrysalisses," Vol. II., p. 375, line 5, from bottom), evidently intended for "chrysalides," though this seems an unfortunate term to apply to Ægeriad pupæ.

Volumes X and XI, dealing respectively with the Indo-Australian "Bombyces and Sphinges" and Noctuidæ are incomplete and the recent death of Mr. W. Warren, who was employed on Vol. XI., will probably delay the completion of the work, presuming that this survives the War at all.

This book is likely to be useful to the Lepidopterist in India, who is usually rather isolated from an adequate entomological library, provided that he realises that Dr. Seitz's volumes form only a preliminary introduction and provide in many cases merely indications of the affinities of the species which he wishes to identify. We do not wish to decry the book, which is excellent so far as it goes and distinctly good value for money. The coloured plates are good and provide recognizable figures of the normal forms of the insects depicted; but the amateur will thereby be apt to be misled into supposing that every specimen which he obtains can be determined by the figures given—a hopeless task in such genera as *Zygæna*, *Lithosia* and *Hepialus*.

These volumes should find a place on the entomological bookshelves of the numerous scientific institutions (*e.g.*, Agricultural Colleges and Universities) which exist in India and will there be useful to those whose interests lie in the study of Moths.

Fauna Palaearctica, Vol. 1, 379 pages and 89 coloured plates, Royal 4 to, £3. Vol. 2, 480 pages and 56 coloured plates, £ 2-5-0, to be completed in 4 Volumes. not sold separately.

Fauna Indo-Australica to be completed in 155 parts at 1/6 per part n paper covers. Vol. 9, 10 and 11 in issue.

MISCELLANEOUS NOTES.

No. I.—VITALITY OF INDIAN WOLF (*CANIS PALLIPES*).

I shot a large male wolf as he was galloping past me and hit him in the abdomen, a little in front of the off stifle joint and blew out his intestines. On being hit the wolf stopped and snapped at and bit off all his remaining intestines except about 2 feet of the commencement which is attached to the stomach.

He then trotted off into a series of nullas for about 300 yards, but I turned him towards a big sandy nulla which he tried to cross to get into a patch of sugarcane. Some villagers turned him and he made several rushes at them open-mouthed while they were doing so. He then trotted down the nulla (my second shot missed him and the third shot cut the skin on the tod of his head without in any way damaging the skull) got up on to some open land and again crossed the nulla, and when he reached the other side was brought down by a villager striking him across the back with a *lathi*. In all he travelled, after being hit, at least half a mile and probably would have gone very much further. I weighed him on arrival in camp and found (after losing all his intestines and a certain amount of blood) that he weighed 45¾ lbs.

As he was a large wolf his measurements may be of interest. Head and body 34·5″, tail 13″, ear 4·5″, hindfoot 8·35″.

The skin and skull (No. 3/1913) have been presented to the Mammal Survey.

HAZARIBAGH DISTRICT, 27*th July* 1914. O. A. SMITH, MAJOR.

No. II.—EFFECT OF CASTRATION ON BLACK BUCK.

In a recent issue of the Journal I noticed an article on this subject which entirely agrees with my observations when in Peshawar in 1910. I was at the time attached to the Royal Warwichshire Regiment, who had a couple of fine Bucks as their regimental pets. One was rather a savage tempered brute and used to give considerable trouble on parade. When the question of improving his temper by the medium of castration cropped up, there was some demur on the subject, as the general opinion was that rather akin to the case of Samson's locks would be that of the Buck's fine black coat after the operation. However some ultra-flagrant act of violence towards his keepers settled his fate, and it was hoped that his fighting days were over. Now each year during the hot weather the bucks' coats used to change to a dull-brown and the beautiful glossy black did not re-appear till the cold weather.

But on this occasion the gelt buck's coat changed to a very beautiful fawn colour, and when winter came round it did not re-assume the fine distinctive colour of the normal buck. The above facts can be corroborated by any of the regiment who were in Peshawar at the time.

C. R. PITMAN,
27th Punjabis.

TANK, N. W. F. P., 17*th September* 1914.

No. III.—FURTHER NOTES ON WILD PIGS.

On 1st October 1914, I shot a boar near Nathua Maran. Viewed from behind it appeared to be absolutely destitute of hair either on the body or

on the crest; close examination however showed that its hair, including the crest, was not more than about 1 inch in length. This is very unusual, as I have seen a lot of wild pig both stuck and shot. The pig did not appear to be suffering from mange or any other disease. I wonder if any other member has ever come across a similar case?

Last April I shot a boar which was somewhat bare about the body, but had a lot of hair on its back and a very big crest. The animal first mentioned was about 5 years old and measured as follows: snout to base of tail (straight) 47", tail 12", height 28".

According to the natives of these parts there are two varieties of pig, which can be recognised both in the wild and the village pig: first variety is called Baseelwa, second variety Moonar. The differences are as follows:— Baseelwa have a very long skull with long snout and are thin and not broad. The Moonar has a short skull with a short suffy snout and is stouter and very broad. There are no differences in colour or height, but the pregnancy in the Baseelwas is said to last for six months, while that of the other variety is a month less.

I send this note as another member has brought to notice that two varieties are noted in his district and also because one of the wild pig skulls, (female), which I presented to the B. N. H. S. Mammal Survey was very elongated.

O. A. SMITH, Major.

Hazaribagh District, 10*th October* 1914.

No. IV.—NOTE ON A STRANDED GREAT INDIAN FIN WHALE (*BALÆNOPTERA INDICA*) AT RATNAGIRI.

(*With a Plate.*)

A whale was washed ashore at Dhabool, 97 miles south of Bombay. It was first noticed on Wednesday morning, 11th December and I saw it on Saturday afternoon, the 14th. The Customs Karkun informed me that the animal was lying on its back stomach upwards, but when I first saw it the carcass had turned half over on to its side. It was only visible at low tide, being under water when the tide was in. I took the following measurements:—

Total length (tip of snout to tip of flukes) ..	41 ft.
Tip of snout to angle of mouth	9 ft.
Do. to blowholes	8'-7"
Length of flipper	4'-5"
Width of flipper at base..	1'-7"
Eye to flipper	4'-5"
Base of tail to posterior end of dorsal fin ..	6'-8"
Dorsal fin height	2'-3"
„ „ base	1'-2"
Flukes tip to tip	9 ft
Breadth from notch of flukes to angle with body.	2'-0"

The animal was too far decomposed for any accurate idea of the actual colour to be obtained most of the epidermis having pealed off, but such as was left was slate grey in colour, while the flippers were very much darker almost black. The inside of the mouth was a dirty yellowish-white. The Karkun, who saw the animal when it was on lying on its back, said that the stomach was whitish, while he described the sides as greyish-black and the mouth parts pink.

The sides presented a fluted appearance with parallel lines running along the flanks beginning well behind the flippers and terminating close to the mouth. The animal was a male.

During my stay at Dhabool several hundreds of villagers, both from the coast and inland, came to see the animal. They regarded it as a god, calling it "Massa Dev," meaning fish-god. The local Fakir had established himself well to the windward of the carcass, several incense sticks were burning in front of it, more I think with a view to the gentleman's own comfort than in homage to the deity. A sheet was spread out in lieu of a collection bag and it was covered with copper coins and also offerings of rice and cocoanuts. I noticed that a great number of these people were Mahomedans. The prevailing idea among them was that treasure of considerable value could be got by cutting open the stomach of the animal. This was believed not only by the common folk but even by the Government clerks.

S. H. PRATER.

BOMBAY NATURAL HISTORY SOCIETY'S MUSEUM,
5th December 1914.

From time to time whales are stranded or washed up at no great distance from Bombay, and these are reported to the Society by the Customs officials, though so far we have not been successful in getting to the spot before the animal has become decomposed and lost its colour. The colour of our large Indian Fin Whale is still unknown, but perhaps some member situated on the coast may be fortunate enough to see a freshly stranded specimen and record notes on it. The specimen recorded above is apparently an immature great Indian Fin Whale (*Balænoptera indica*) as this whale grows to 80 to 90 feet, according to Blanford. There is, however, at least one other species of *Balænoptera*, which has been recorded from the Indian region, *viz.*, *B. edeni*, but this is said to be a smaller species and is only recorded from the Bay of Bengal.

As was already reported in the Journal, Vol. XVII, a whale was washed ashore at Bassein, a little north of Bombay, in the spring of 1906, which was said to be 63 feet in length, but it was not reported to the Society till nearly a week after stranding. In January 1911 another was reported at Viziadrug, near Ratnagiri, and to examine this specimen Mr. Crump, who had just joined the Society as Mammal collector, was sent. On his arrival he found that nothing remained but the head and some of the larger bones ; he was however able to secure some baleen. This whale was reported by the Customs Karkun there, to measure about 70 feet from nose to tip of tail in a straight line. Mr. Crump made a number of sketches and took measurements of the bones lying about.

In August 1912 a large Fin Whale was stranded at Ratnagiri, which was reported to be 61 feet in length. The colour above was said to be "dark grey in places almost black" and on the sides "lighter than on the top with well defined stripes below the flippers." The underside was "light grey in places almost white," while the tail and flippers were "almost black." A photograph of this whale was forwarded and is here reproduced.

Quite a number of whales seem to have been stranded about this time and the remains of several of them were washed up on the Ratnagiri coast. Much valuable information in regard to the different species of Whales would have been secured if it had been possible to preserve some of the bones of these whales. It is, however, impossible to keep such large bones in the Society's rooms ; and as there seems to be no prospect of a Natural History Museum in Bombay, it will be a long time before the species of Fin Whales found on this side of India can be satisfactorily determined.

N. B. KINNEAR.

No. V.—AN UNIDENTIFIED ANIMAL IN SOUTH MALABAR.

Can any Member throw any light on the following extract from a paper by Blyth (J. A. S. B. XXVIII, p. 286, 1859)?

"Some time ago, Mr. Baker asserted in a communication to a sporting periodical his belief that a real Mole existed in his neighbourhood. (*Footnote.*—"Going through the hills, I often come upon a small black velvet-coated creature dead, with the head bitten off. The paws are precisely like those of the English Mole, with a similar tail; the whole a finger's length and about an inch thick. It would be curious to know what kills this animal and whether it be a true Mole, as I think it.")

He now writes:—"I have since had three specimens of the Mole brought to me, but all too far gone for preservation; they were perfectly black with white belly. Moles they certainly were."

It is unfortunate that the skulls were not preserved, or even the entire skeletons in spirit; but I trust ere long to receive examples from Mr. Baker, as a *Talpa* from S. India would be a very unexpected discovery; though, as stated in the sequel, we possess the *T. leucura*, nobis, from the hilly region bordering on the valley of the Sitang river in British Burma, where co-existing with a *Tupaia* and a *Hylomys*. (*Footnote.*—In a subsequent letter, Mr. Baker remarks: "With the assistance of the hill-people we contrived all kinds of springes, trap-falls, &c., in order to catch the smaller animals; but we could not manage a common Mole-catcher's trap, and I was fairly beaten by a *digger* whose runs reminded me of those of the Mole at home. He seemed to beat us by his *mining*, perhaps however by the numerous ramifications of his burrow.")

Blyth's correspondent was the Rev. H. Baker, Junr., of Mundakyum, Alipi, Southern Malabar.

The 'burrows' in Mr. Baker's second communication were no doubt those of *Gunomys kok*, the common Madras Mole-rat, but the mysterious animal he mentions in such detail is still unknown.

R. C. WROUGHTON.

British Museum (Natural History),
London, S.W. *November*, 1914.

No. VI.—THE WHITE-BROWED BUSH ROBIN (*IANTHIA INDICA*) IN THE N. W. HIMALAYAS—A CORRECTION.

In Volume xxii, page 795 of the Journal, the late Mr. P. T. L. Dodsworth recorded the occurrence of *Ianthia indica* in the N. W. Himalayas and quoted me as confirming his identification. Some time afterwards Mr. B. B. Osmaston wrote to me asking if I was quite sure of the identification as he himself had once recorded a specimen, which he afterwards discovered to be *Larvivora brunnea*! After some delay I learnt that the specimen was in Mr. A. Jones's collection and he, at my request, forwarded the specimen. On re-examination I find the skin is, as Mr. Osmaston suspected, *Larvivora brunnea*, and I therefore take this opportunity of correcting the record.

Mr. A. Jones has kindly presented the specimen to the Society.

N. B. KINNEAR.

Bombay Natural History Society's Museum,
1st *December* 1914.

No. VII.—OCCURRENCE OF THE MARTIN (*CHELIDON URBICA*, L.) IN THE PUNJAB.

On the evening of 16th May this year in the midst of a dust-storm at Hissar I observed two birds flying in a northerly direction, which were clearly House Martins (*Chelidon urbica*, L.). About an hour later near the same spot I observed a third Martin following the same line of flight and succeeding in shooting it. The specimen which was a female, fat and moulting, has been compared with English specimens and is an undoubted example of the typical British race.

HUGH WHISTLER, M.B.O.U.,
Indian Police.

SIRSA, HISSAR DISTRICT, PUNJAB,
17*th October* 1914.

No. VIII.—VULTURES FEEDING AFTER SUNDOWN.

In a recent number of the Society's Journal, a member shooting in the Gir Forest noted that kills had to be covered with branches on moon-light nights (as far as I can remember), otherwise the vultures fed during the night and picked them clean. In regard to the preceding, what happened last night (9th December 1914) may be of interest. My old pony died on the night of 8th December of tetanus, so I decided to let the body be picked clean by vultures and to burn the bones.

The body was put out on an open piece of ground about 250 yards from my tent, and the vultures came in due course.

A little before sunset there were then about 100 birds round the body. I asked the villagers "how soon will the vultures clear off to roost and leave the body," as I wanted to sit up in case a leopard came. Their reply was "the only birds that will go are those that have already filled themselves, the others will remain and go on feeding all night." I pointed out that it was a dark night. Their reply was "that doesn't matter, they won't leave that body until it's picked clean."

So I didn't sit up over the body. At intervals I went outside and heard the screeching of the birds as they fed on the body, and this continued until moon-rise when they were disturbed by a leopard who dragged the body away a short distance.

I personally did not previously know of this habit of the ordinary vulture (griffon?). I saw no red-headed vultures near at sunset. The moon was first day of the last quarter.

O. A. SMITH, MAJOR.

HAZARIBAG, 10*th December* 1914.

No. IX.—NESTING OF THE HOBBY (*FALCO SUBBUTEO*, LINNÆUS) NEAR SIMLA, N. W. HIMALAYAS, WITH SOME GENERAL REMARKS ON THE GENUS *FALCO* AND ALLIED SPECIES.

As the breeding of this Hobby within Indian limits is of somewhat rare occurrence, I venture to give an account of a nest which I found on August the 16th.

This nest was in a deodar forest, at an elevation of 6,000 feet and within 2 miles of Simla. I may here remark that this, or another pair of

Hobbies. have probably bred in the vicinity in former years, because the friend who accompanied me on my second visit on August the 22nd assured me that two years ago, and in the immediate neighbourhood of this wood, he saw five birds, probably the old birds with their young *perched on trees.* In June this year I had pointed out to him a Hobby when he at once suggested that this was the bird he had seen. I told him it was improbable that they bred this side of the snows, but I think now he was correct in his assertion.

The situation of the nest I found was on three horizontal branches and 40 feet up a deodar (*C. deodara*). It was an oblong in shape, measuring approximately 12″ × 10″ by 2½″ in depth with a central depression of 2 inches. The nest was composed entirely of fine twigs which did not exceed the diameter of an ordinary pencil.

There were three young in the nest about 16-18 days old. I was attracted by their cries which closely resemble those of the kestrel (*T. alaudarius*). At the same moment I saw one of the old birds leave the nest.

Sitting down I watched their proceedings during a vigil of two hours, and had repeatedly the pleasure of seeing the parents bring food which must have consisted of small insects (chiefly beetles, judging from a pellet disgorged by the young one I took in the hopes of rearing it), though they occasionally indulged in flesh diet (*vide* remarks *infra*). The old birds brought food at intervals of 10 to 15 minutes, their approach being heralded by the hungry cries of their brood. As the parent bird alighted on the nest the young greedily rushed to secure the tit-bit which was always carried in the feet. The duration of these visits lasted but a few seconds. The food being disposed of, a hasty glance round and the parent slipped quietly off, mounting to feed in mid-air 500 feet above the level of the nest. When food was secured the bird dropped with marvellous velocity to the nest. After some time I ordered my climber to go up and bring one of the young ones down and also to lift the remaining two to ascertain if by any chance there was an addled egg. Immediately he extended his hand over the side of the nest, the young Hobbies threw themselves on their backs presenting their claws and open bills, at the same time making as much noise as they were able.

While the intruder was at the nest one of the old birds was perched on the top of a tree, 50 yards away, answering the young but otherwise making no demonstration—behaviour which compares unfavourably with that of a kestrel (*T. alaudarius*), which, while I was taking its eggs, had to be kept off by throwing stones.

On August the 22nd, a friend accompanied me to see how the young Hobbies were progressing. On our arrival one of the old birds was sitting, with its breast towards us, on the side of the nest, remaining there quite 5 minutes. Giving my friend the glasses I asked him to describe the bird as he saw it. He said " it is like a small shahin " (*F. peregrinator*), (a bird well known to him) " with heavy black markings on the underparts."

After the parent had departed, I told the climber to go up when he reported the two remaining young ones dead. These I ordered him to throw down. On examination one proved to be partially eaten ; the crop of the other contained portions of a small bird.

Torrents of rains (about 8 inches being registered) had fallen since my last visit, probably to the undoing of the young Hobbies.

The disappearance of the young birds of prey from their nests is not an uncommon occurrence and this instance leaves little doubt, but that the parents, though they may not have killed them, sometimes, at least eat them.

Probably the nursery of these Hobbies had originally been built by crows (*C. macrorhynchus*) and had been altered to suit the requirements of the former, the members of this genus rarely, if ever, building an entirely new nest but simply effecting a few structural alterations.

In the Fauna B. I., Aves, Vol. iii, page 417, Blanford remarks in reference to the nesting economy of the shahin (*F. peregrinator*) "the nest of this falcon, *a mass of sticks*," &c. This is by no means invariably the case, *vide* the Journal, B. N. H. S., Vol. XXII, No. 3, page 629, wherein the late P. T. L. Dodsworth records the taking of two eggs of this falcon, "the eggs were reposing on the bare ground." Moreover, three eggs of this species which I took this year also rested on the ground. These remarks also apply, I think, to the kestrel (*T. alaudarius*), the merlin (*Æ. regulus*), the peregrine (*F. peregrinus*) and the luggar (*F. jugger*).

When the eggs of any of the above are found *in nests*, it will usually be found that the falcon has taken possession of the deserted home of some other species. Whether the red-headed merlin (*Æ. chicquera*) differs in these habits would appear to be a moot point. Certainly in one instance, at least, I once found the eggs of this species in an old nest, probably that of *Corvus splendens*.

A. E. JONES.

Simla, *September 16th*, 1914.

No. X.—THE CUCKOO (*CUCULUS CANORUS*) IN THE CENTRAL PROVINCES.

With reference to your footnote in the above article, I could show you a skin of the common Cuckoo shot at Nagpur in June. Cuckoos are regularly heard here in that month, but both the specimens which I shot were males. Comparing these with a male taken on the Darjeeling Himalayas, they are decidedly smaller, the latter exceeding them by about an inch in the total length. The wing measurements are 8·75″ and 8·8″ as compared to 9″ in the hill bird and the undertail coverts of the C. P. specimens are rather irregularly banded with black.

E. A. D'ABREU, F.Z.S.

The Museum, Nagpur,
9th March 1914.

No. XI.—THE RED TURTLE DOVE (*ŒNOPOPELIA T. TRANQUEBARICA*).

In reply to the query in Misc. Note, No. XVII, Vol. XXIII, No. I, the following dates may be of interest. The flocks of males in Chanda, C. P., were noted on the 22nd April 1913 and on the 24th March this year. I saw a male in Dera Ismail Khan where they are rare.

I found this dove fairly well distributed throughout the Chanda District, where it was breeding during April—a nest C/2 with fresh eggs was taken on 8th April 1913 and a pair were observed building on the 19th of that month.

C. R. S. PITMAN,
27th Punjabis.

Tank, N. W. F. P.,
15th September 1914.

No. XII.—THE LESSER FLORICAN (*SYPHEOTIS AURITA*, Lath.) IN THE PUNJAB.

The Lesser Florican is so seldom met with beyond Delhi in Upper India that the following records may be of interest. On 21st July last my

attention was attracted by an unknown black and white bird which was standing and occasionally jumping into the air, in a grass field on the Government Cattle Farm at Hissar. It was shot and proved to be a male. The stomach contained grasshoppers. Other specimens were seen in the grass lands of the Cattle Farm Bir by Mr. Blanford, I.C.V.S., as follows :— 8th August, one, probably a male ; 23rd August, a male ; 6th September, male and female found separately. One of these latter specimens is believed to have been seen again on 24th September.

HUGH WHISTLER, M.B.O.U.,
Indian Police.

SIRSA, HISSAR DIST., PUNJAB,
17*th October* 1914.

No. XIII.—HABITS OF THE KALIJ PHEASANT.

It may be of interest to note that on 30th ultimo I came across a cock Kalij Pheasant (*G. horsfieldi*) looking after a flock of young a few days old. I saw no sign of the hen, though I watched the cock for several minutes. Probably she was absent looking for food. The cock was very aggressive and ran around demonstrating, often coming within 10 yards of me. The chicks were hiding in the leaves, one within a few inches of my feet.

H. W. A. WATSON.

MOGOK, BURMA, 6*th April* 1914.

No. XIV.—EGRET FARMING IN SIND.

With reference to Mr. Birch's interesting article on this subject I should like to mention one or two points which appear to require further elucidation. I have heard a good deal about Egret farming lately, and though never having seen an Egret farm myself I have interested myself in the subject and have endeavoured to gain as much information as possible regarding the methods followed in collecting Egret plumes.

As a rule the so-called Egret farms are situated in localities difficult to access in the hot weather, and so far I have never met a European official who has seen one except in the cold weather.

All officials, however, whom I have questioned on the subject, have told me that the birds they have seen are kept for breeding purposes. but the only evidence they had to support their statement was that the owners of the farms had told them so.

On several occasions I have observed natives catching Egrets by means of decoy birds that had their eyes sewn up by means of a feather passed through the eyelids. These birds were placed in a spot frequented by Egrets and not being able to see, remained where they were put down. The ground round about being strewn with loops any birds that alighted near them stood a very good chance of being entangled. On one occasion last year also I saw some 50 or 60 birds being despatched by rail, every one of which bore evidence of having had their eyes sewn up, some were quite blind with their eyelids so swollen that they could not open them, while in others, though they could open their eyes, one could distinctly see where the eyelids had been pierced. I questioned the man in charge of them, and at first he told me that the birds were for breeding purposes and that he plucked their feathers every year and sold them to a "Sahib" at Rs. 18 per tola, but eventually he allowed that they were decoy birds being

sent to a "Sahib" on the Sutlej. Before, however, I could find out any more, his "better-half" turned up and slanged him roundly for giving the show away. Now my ideas on the subject are that the feather traders, knowing it to be illegal to destroy Egrets for their feathers, keep these decoy birds in more or less humane surroundings during the cold weather when they are likely to be visited by European officials and have invented the story regarding their breeding in captivity, and all the evidence I have obtained on the subject goes to prove my theory.

Mr. Birch states in his article that there was "ample evidence to indicate that the birds breed freely" but he does not state the nature of his evidence. Did he himself see the old birds sitting on eggs or young and were the photographs reproduced taken by himself? It seems extraordinary that the birds should assume breeding plumage four times a year, when I believe many birds do not assume breeding plumage at all in unnatural surroundings. In a natural state Egrets commence breeding at the very earliest in June, and the majority not till July, did Mr. Birch himself see them breeding in March or was he only told so?

Again Mr. Birch does not state at what time of the year he visited the farms, it would be most interesting to know this. As if he himself saw the birds breeding in March and took the photos himself his statements require no further confirmation, but if he did not see the bird sitting himself and did not himself take the photographs I am afraid without further confirmation his article is of little use from a scientific point of view.

It would be a dangerous undertaking to legitimize the feather trade at present, as even though Egret farming could be carried out on the lines stated by Mr. Birch in Sind, there are still a large number of birds slaughtered for their plumes all along the Indus, Chenab and Sutlej rivers and should the trade be legalized those who collect the feathers by slaughtering the birds would take full advantage of the law, and it would be next to impossible to convict them of obtaining their feathers in an illegal manner. Other species of birds also would suffer by the removal of the restriction, as it would be quite impossible to breed several of the species whose plumes are sought after profitably in confinement; and even should it be possible to breed all birds in captivity for the sake of their plumage, why should the vanities of the female sex be pandered to at the expense of the wretched bird whose lot in confinement, even under the most favourable circumstances, is wretched as compared with that of his kind at large.

The above remarks are not intended to cast any reflections on Mr. Birch's article, but I do consider that, in order to remove all doubt on the subject Mr. Birch should state whether he actually saw the birds incubating eggs himself and whether he himself took the photographs, as it would be a very simple matter to place young wild birds in the aviaries during his visit there.

J. LINDSAY SMITH, MAJOR, M.B.O.U., I.A.

QUETTA, *3rd August* 1914.

[On showing the above note to Mr. Birch he replied as follows:—"The photographs printed in the Journal were all taken *on surprise visits* to different farms. Plate A. at a place 7 miles from Rohri on the bank of the Western Nara; Plate B at a village 6 miles from the town of Larkana; Plate C. at Rahuja on the Sukkur Canal, a place 3 miles from Sukkur. The first two photos were snapshots taken by myself. I had to secure the help of a professional photographer to take Plate C., as my Kodak was not large enough to get an interior view; but I visited this farm myself also. The other photos sent to you which were not published were taken by me personally."—EDS.]

No. XV.—COTTON TEAL (*NETTOPUS COROMANDELIANUS*) IN KASHMIR.

You may be interested to learn of the occurrence of the cotton teal in a region so far removed from his usual habitat as this is. On Monday on the great Holdra jheel, about 6 miles from here in the first shoot of the season, I killed what appears to be a young male, though the dark ring below the neck is absent. I showed it to Col. Ward who had no note of a former occurrence in his "Birds of Kashmir." He is having it skinned and if you wish it I will send you the skin. Curiously enough the boatman who was out with me seemed to know the bird which he called a "Noora," but he had never seen it before in the shooting season. The bags per gun made on Monday varied from 60 to 168 (7 guns) chiefly teal and whiteyes, but there were some mallard and a few gadwall, also a Wigeon. Some pintails and a gaggle or two of geese were seen.

F. J. MITCHELL.

SRINAGAR, 14*th October* 1914.

No. XVI.—MALLARD BREEDING IN THE KARACHI ZOO.

A pair of Mallard caught at Pithoro, Sind, in February 1914, produced 6 ducklings towards the end of June in the Zoological Gardens, Karachi, to the surprise of a good many people in the locality. Two out of the six have since died, but the remainder (3 ♀ ♀, 1 ♂) are still flourishing and have at the time of writing assumed their full plumage. There are no signs whatsoever of any cross having taken place. The parent birds escaped from the Duck Pond and constructed their nest in a dense bamboo thicket on an island in the middle of the Large Pond reserved for Storks, Geese and Pelicans. The nest was not discovered until after the hatching had taken place.

I am not aware that the Mallard, *Anas boscas*, has been known to breed (even in captivity) in the plains of India before, hence I thought a short note on the occurrence might be of interest.

F. LUDLOW.

KARACHI, 28*th September* 1914.

No. XVII.—MARBLED TEAL ON THE N. W. FRONTIER.

I think it may be of interest to you to know that I shot a ♀ Marbled Teal (*M. angustirostis*) this afternoon, about 9 miles west of the Cantonment on a small jheel near the Kabul river. I have never heard of or seen this duck in these parts before, I do not know whether it has been often recorded from N. W. Frontier?

W. M. LOGAN HOME, CAPT.,
12th Infantry.

NOWSHERA, N. W. F. P.,
11*th October* 1914.

No. XVIII.—NEW GAME BIRDS FROM THE N.-E. FRONTIER.

In the last Number of the Bulletin British Ornithologists Union, Vol. XXXV, p. 18, Mr. E. C. Stuart Baker described a new Blood pheasant as *Ithagenes tibetanus*. This species differs from the lately described *kuseri* in being much paler below and the crimson being confined to the breast. The lores are crimson instead of black and the supercilium instead of

being black and crimson is pure crimson. The black gorget is much restricted compared with that of *kuseri*. The other species described is *Tragopan blythi molesworthi*, which differs from the typical *blythi* in being much darker above, the red on the breast being more confined and the whole underside much paler. Both these specimens were collected by Capt. Molesworth on the borders of Tibet and the N.-E. frontier and presented to the Society.

No. XIX.—OCCURRENCE OF NAIA BUNGARUS (Schleg) IN THE PUNJAB.

According to Dr. J. Ewart in the "Poisonous Snakes of India" (1878), the king cobra therein described as *Ophiophagus elaps* has three varieties which he says are distributed as follows: "The first variety (the olive-green one) is found in Bengal, Assam, the Malayan Peninsula and Southern India (*Fayrer*); the second (brownish-olive) in Bengal (*Fayrer*) in the Philippine Islands and perhaps in Burma (*Gunther*); and the third (uniform brownish-black) is found in Borneo (*Fayrer*). W. Theobald in the "Descriptive Catalogue of the Reptiles of British India" (1876), describes it as *Naja elaps* and says "that it inhabits India, Burmah and the Tenasserim Provinces." Dr. Boulenger in the "Fauna of British India, Reptilia and Batrachia" (1890), says that it inhabits "Southern India, Orissa, Bengal, Assam, Burma, the Andamans, Siam, the Malay Peninsula, Java, Borneo, Sumatra and Philippines." While Major Wall in "The Poisonous Terrestrial Snakes of our British Indian Dominions" (1913), gives the distribution as "it is found throughout our Indian dominions (with the exception of Ceylon and I believe Western Rajputana, Sind, and the Punjab (?); in suitable localities, that is in jungles or their vicinity. It occurs in hilly regions up-to an altitude of 7,000 feet and in the plains in their vicinity." The query mark after Punjab indicates that Major Wall is rather doubtful as to the occurrence of the hamadryad or king-cobra in the Punjab. Recently, however, I obtained a specimen from the forest on the banks of the River Ravi near Lahore. Also there is a specimen in the museum of the Government College, though no locality is given as to where the specimen was taken. The form thus apparently occurs in the Punjab.

BAINI PARSHAD, B. SC.,
Alfred Patiala Research Student.

Zoological Laboratory, Government
College, Lahore, 8*th October* 1914.

No. XX.—A NEW *PENTHEMA* FROM BURMA.

(*With a plate.*)

Among other butterflies caught by me in the Tharrawaddy District of Lower Burma is a *Penthema*, allied to *darlisa* M., but unlike any form hitherto described. The differences between it and *darlisa* seem greater than those between *darlisa* and *lisarda*, Db., and if these forms represent two distinct species the new one should represent a third. I propose to call this new form *yoma*.

Penthema yoma nov. sp.

Description.—Upperside of forewing differs from *darlisa* chiefly in that the straw coloured streak in interspace 1*a* is absent, or only just indicated at the posterior angle. Further, the spot in interspace 4, of the post discal series is considerably out of line with the rest. This character is

present in *darlisa*, but is not so marked in *lisarda*, the two series are almost parallel. For the rest, the spots are in the same positions, and are of the same colour and size as those of *darlisa*. The black ground colour is similarly glossed with blue.

Hindwing.—Basal area uniform black, there being sometimes just a dusting of straw-coloured scales in the apex of the cell. The straw-coloured internorvular of the discal series streaks are broad and clavate, herein differing from both *darlisa* and *lisarda*. They might almost be said to form a band traversed by the black veins. These streaks are followed by a sub-terminal series of spots, more or less hastate in shape and as broad as the interspaces; the postdiscal series, common to all forms of *darlisa* and *lisarda* is absent, the discal streaks extending to the position these spots should occupy. All these markings are pale straw-coloured, as in *darlisa*.

Underside.—Ground colour as in *darlisa*, that is apex of forewing and all the hindwing rufous brown, the basal area of the forewing darker, not rufous. Streaks and spots as on the upperside. Antennæ, head, thorax and abdomen as in *darlisa*.

Expanse.—110-125 mm.

Habitat.—Pegu, Yoma, Tharrawaddy District in Lower Burma. Described from two specimens from the above locality, caught in April 1909 and May 1912, in heavy jungle. Elevation 200 to 1,500 feet. One was taken feeding on the skull of a recently killed serow.

The type specimen, which I take to be a male, has been deposited in the British Museum.

These two specimens were the only Penthemas I got in four years' collecting in Tharrawaddy. It does not seem as if either *darlisa* or *lisarda* flew with it. On the other hand a single *Penthema* I have from the Arakan, Yoma, Henzada District, to the west is *lisarda* while on the east, at Pathichaung in the Toungoo District at the foot of the Karan Hills, *darlisa* occurs. It therefore seems likely that the present form is peculiar to the forests of the Pegu Yoma, which forests are isolated from those to east and west by big rivers (Sittang and Irrawaddy) and their plains.

As to whether the form now described should be regarded merely as a race of *darlisa*, it can be understood that a form represents a race of another when its markings are those of that other, either partly absent or reduced or increased in size [*e.g. binghami* race of *darlisa*]. But in the present case while the basal markings are entirely gone from the hindwing, this being apparently a change in the direction of *darlisa*, the discal markings are even more prominent than in *lisarda*, while there is no sign at all of the postdiscal series of spots, common to both those forms, not even of their being joined to the discal streaks.

DeNicèville (Vol. ii, page 144), Bingham (Vol. i, page 390), and Evans, (Journal B. N. H. S., Vol. xxi, page 580), all show three species of *Penthema*; *lisarda*, *darlisa*, and *binghami*. Seitz, at page 463 of Vol. iv, gives two species from India, sinking *binghami* as a race of *darlisa*. He also raises *mihintala* as a new race of *lisarda* from the Chin Hills of Upper Burma and gives two other races of *darlisa*, but all the forms he describes have the markings constant throughout, though reducing in size, and none resemble the present form in the least.

In the accompanying plate the upper figure is *P. lisarda* from the Teesta, the two central figures are *P. yoma* and the lower is *P. darlisa* from the North Shan States. The last named does not quite agree with Bingham's figure, and may not be typical.

E. V. ELLIS, I.F.S.

LYME REGIS, ENGLAND, *7th October* 1914.

1. *Penthema lisarda*, Db. 2 & 3. *Penthema yoma*, nov. sp.
4. *Penthema darlisa*. M.

No. XXI.—A NOTE ON *ARGYNNIS CASTETSI.*

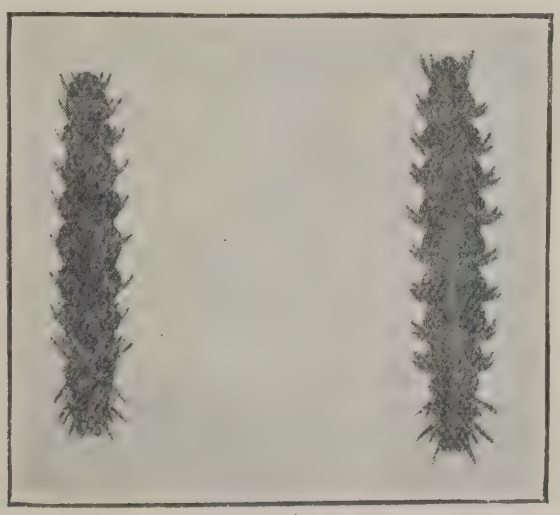
Argynnis castetsi, Oberthür, which occur only in the Palni Hills in South India, is usually considered to be a well differentiated race of the widely distributed *Argynnis hyperbius*, Johanssen. It differs from the type form mainly in that the female, as regards colour and markings, resembles somewhat the female of such a species as *Argynnis aglaia* and in consequence the striking sexual dimorphism exhibited by *hyperbius* is wanting.

In April 1912, owing to the kindness of Mr. V. Evershed of Kodaikanal, who forwarded ova of *castetsi* to Ceylon, I was given the opportunity of comparing the larvæ of the two races, and somewhat to my surprise found that they could be easily separated. A brief description of a full grown larvæ of *A. hyperbius* from Ceylon is as follows:—

Head.—Black; oval in shape with a pronounced frontal furrow or depression; on each side of the furrow on the vertex of the head is a conical prominence bearing a stout spine hair; number of small black hairs are scattered over the whole surface.

Thoracic and abdominal regions.—The ground colour of the body is velvety black with the exception of a broad dorsal stripe which is fulvous red. On each side of the thoracic segments is a pair of black spiny processes, one process being situated to the side of the dorsal line and the other supra-spiracular in position. On the abdominal segments there are two pairs of spiny processes situated as on the thoracic segments and also a third pair, each process being sub-spiracular in position. These abdominal processes are red or fulvous red tipped with black.

The legs are black but the "suckers" of the prolegs are red as also are the anal valves. [The length of this specimen was 38 mm.]



A. hyperbius. *A. castetsi.*

The larvæ of *A. castetsi* resembles that of *hyperbius* in general structure but differs constantly in the following particulars:—

(1) the red dorsal stripe is entirely absent;
(2) the processes on the abdominal segments are pink;
(3) the form is somewhat more slender.

The most reliable character is the presence or absence of the dorsal stripe which appears at a very early age, at once distinguishing *hyperbius* from the allied form.

I have been unable to discover many descriptions of the larvæ of *A. hyperbius* from India but it appears that the forms from the more northern regions of the country always possess the red dorsal stripe. The imagines of *hyperbius* from the Nilgiris are to some extent intermediate between the type and *castetsi* but the larvæ is not apparently described. Until this has been done it is perhaps unwise to venture any remarks on the possibility of *A. castetsi* being a good species. Taking into account however the marked features of both imago and larvæ it would appear, that a *A. castetsi* has a better right to be considered a fine species than many other geographical races, and on the whole it seems that the burden of proof should rest with those who would consider it only a form of *hyperbius*. It is, however, very desirable that the larvæ of the Nilgiri form should be described since the Indian races of this Argynnid seem to be on the border line between distinct species and mere local forms, and as such likely to assist in the solution of several perplexing problems.

An attempt was made in Ceylon to interbreed the two forms but it was unsuccessful mainly I believe owing to the experiment being carried out in too hot a climate. This experiment is well worth repeating if the opportunity occurs, as the results from a fertile pairing would be of the greatest interest. In this connection it may be mentioned that the ova and larvæ of *A. hyperbius* are not hard to find on the food-plant *Viola patrinis* D. C. if the small and sickly-looking plants are searched. In Ceylon healthy and vigorous plants were seldom productive, an observation also made by Mr. Evershed in India.

T. C F. FRYER, M.A., F.E.S.

LONDON, *October* 1914.

No. XXII.—THE BEDA WEED (NILE LILY) *EICHHORNIA SPECIOSA*, SOLMS.

Mr. R. Grant Brown, I.C.S., the Deputy Commissioner, Bassein, Burma, wrote in September 1913, asking if we could give him any information of the best method of suppressing the "Nile Lily" which, he said, was the name of a plant which had appeared in the delta in the last few years and was blocking up the waterways, and enclosed copies of correspondence on the subject.

Mr. M. Laurie, M.V.O., I.C.S., Commissioner, Irrawaddy Division, enquired in July 1913 what happened to the Beda weed during the months of heavy rainfall and to report on the state of affairs on the 1st September 1913.

In reply, the Deputy Commissioner, Bassein, said that from reports received from Sub-Divisional and Township Officers of the Kyonpaw Sub-Division it appeared that the navigable channels were all free of the weed on the 1st of September, though a good deal of it remained in backwaters and along the edges of streams, where it was entangled in bushes. The Sub-Divisional Officer, Bassein, has not yet reported, though a reminder was sent to him on the 8th of August and others since.

Beyond setting free the weeds which have become entangled in bushes and allowing them to be carried away by the current, I do not at present know of any measures which are likely to be useful in preventing a recurrence of the nuisance next year. In this district no unpaid labour has been exacted from the villagers and no attempts have been made to construct booms, though I should have been inclined to experiment with these had it not been for the fact that the experiment has, I understand, been tried in other districts. It seems probable that the conditions in

districts where booms have been made and a large amount of labour exacted from the villagers are now the same as they are here; that is, such labour would in this district (though not perhaps in others) have been useless so far as the future is concerned, while I do not think it likely that it would have assisted navigation in anyway at the time it was undertaken. What seems most needed now is to ascertain (*a*) the habits of the plant, and (*b*) the successful measures, if any, taken for its suppression in other countries.

As to (*a*) I have been able so far to get no information locally. I have asked the Director of Agriculture whether he can help me. It has been the practice in some parts to take the weed up on shore, but there is at present nothing to show that this will prevent its propagating itself in the river at the beginning of next rains, and it may even do harm.

As to (*b*) I have received information from various sources that large sums have been spent in combating the weed in North Australia, America, and other countries; and as to this also I have asked the Director of Agriculture whether he can obtain any information for me. Until such information is obtained, or the success of the experiment already undertaken in the delta established, it seems highly undesirable that any money should be spent in combating the weed or that villagers should be forced to undertake labour which may be useless.

The Deputy Commissioner, Bassein, in September 1913 enquired from the Director of Agriculture, Burma, as to the habits of the Beda weed (said to be called the "Nile Lily"), which is now blocking the waterways of the delta. I have made some enquiries regarding the seeds and the manner in which it is propagated, but have so far failed to elicit anything of value. In some parts of the delta it has been the practice to induce the villagers to drag it up on to the bank. It seems quite possible that this work may be useless and may even aggravate the evil.

I am informed that large sums have been spent in combating the weed in North Australia, America, and other countries. If this is the case, it is highly probable either that some effective way of keeping down the weed has been discovered which could be used in Burma, or that all measures tried have proved to be useless. Information as to the methods used would be very valuable; in the latter, it would probably be useless to go on spending money for the labour of villagers in attempting to suppress the nuisance. In this district all attempts to suppress it have been abandoned for some months, and the waterways are now clear, the weed having been carried away by the current.

The weed is not mentioned in the *Dictionary of Economic Products*, which includes a number of pests.

Mr. A. M. Sawyer, Assistant Botanist, forwarded the following note on this weed:—

"This is the *Eichhornia speciosa*, Solms, the most persistent and troublesome of tropical weeds. It propagates itself by means of seeds and suckers both of which are light and driven by the wind. It is already a terrible curse in Florida, Java and Australia. In Ceylon a special law—the "Water Hyacinth Ordinance"—was passed in 1909 against its importation and cultivation. Last year, at the request of the Executive Engineer, Pegu, I was deputed to inspect the Pegu Canal and the *In* near the village of Thanatpin which were then full of the weed. The conclusion arrived at by us was that the most efficient, though expensive, method of dealing with it would be to cut it into sections and drag these out by suitable steam-tugs into the strong current of the river or even into the sea itself as is now regularly done with the "Sud" in Egypt, Florida and elsewhere. As the plant flourishes chiefly in *stagnant fresh-water*, this method is the only one con-

sistent with efficiency and therefore economy, that can be suggested for trial in places where the weed is already thick enough to be cut and dragged out in fairly large masses. In places where it is not clumped together, it may be collected and either dragged into the current of streams to be carried out to sea or thrown on to bamboo rafts or into boats to be subsequently heaped upon the shores of the waters it infests and there *completely burnt*, when dry enough, if necessary, with the aid of an inflammable material like *Ye-nan* or *Crude Kerosine Oil*. As the plant easily takes root and grows well on moist earth, burning it is one of the safest means of destroying it. Thus dragging out to sea and burning are the only two efficient methods of dealing with the weed ; and either is now practised wherever it prevails.

The weed is spreading rapidly in the country ; and it is high time now that prompt and systematic measures and co-operation were enlisted in attempts to its extermination, even, if need be, aided by the law."

EDITORS.

PROCEEDINGS

OF THE MEETING HELD ON 13TH OCTOBER 1914.

An "At Home" of members and their friends of the Bombay Natural History Society took place in the Society's Rooms on the 13th October 1914.

The election of the following 29 members since the last meeting was announced :—Mr. V. H. T. Fields-Clarke, I. F. S., Kindat, Burma; Mr. A. S. V. Acott, I.C.S., Sukkur; Capt. C. Harvey-Kelly, Karachi; Capt. A. Marshall, Quetta; Sahebzada Sardar Mahmed Khan, Larkana; Mr. J. C. Curry, Sukkur; Mr. A. C. Robinson, Sukkur; Mess Secretary, 13th Rajputs, Agra; Mr. E. Eisenhofer, Lampong, North Siam; Lt.-Col. C. Stuart Prince, I. A., Lucknow; Mr. C. J. Hall, Travancore; Dr. Wm. Mowat, Peermade, S.I.; Mr. L. Price, Travancore; Mr. H. L. Cruttwell, Cuttack, Orissa; Mr. W. H. A. Webster, Kyankse, U. Burma; Mr. H. G. Stokes, C.I.E., I.C.S., Madras; Maharana Shri Jorawarsinhji Partapsinhji, Raja of Sunth, P. O. Sunth-Rampur, Rewa Kantha; Maharaj Kumar Shri Vijaysinhji of Rajpipla, Nandod, *via* Ankleshwar; Mr. Chas. J. Hodgkins, Dera Ghazi Khan: Mr. Baini Parshad, B. Sc., Lahore; Mr. H. G. Gruer, I.C.S., Chanda, C. P.; Mr. N. Padmanabha Panikkar, Trivandrum; Mr. J. B. Norman, Champaran; The Registrar, University of Punjab, Lahore; Mr. F. E. Sharp, Rajkot; Mrs. Reddoch, Rangoon; Capt. E. G. Colvin, The Residency, Indore; Mr. E. H. N. Lowther, Calcutta; and Mr. A. H. Marshall, Rohtak, Punjab.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting :—

Contribution.	Locality.	Donor.
2 Takin Skins and Skulls (*Budorcas taxicolor*), 2 Golden Cats (*Felis temmincki*), 1 Panda (*Ælurus fulgens*), 2 Flying Squirrels (*Petaurista* sp.) 1 Bamboo Rat (*Rhizomys* sp.)	Burmo-Chinese Frontier.	Mr. Lowis.
1 Himalayan Serow (*Capricornis*), 1 Goral (*Næmorhedus goral*), 1 Mouse Hare (*Ochotona roylei*).	Kumaon ..	Col. H. C. Tytler.
1 Desert Foxes (*Vulpes leucopus*), 1 Jungle Cat (*Felis affinis*), 1 Jackal (*Canis indicus*).	Hissar, Punjab ..	Mr. C. E. Branford.
1 Langur (*Presbytis phayrei*) ..	Burma	Mr. F. C. Purkis.
1 Slender Loris (alive) (*Loris lydekkerianus*).	Bombay docks ..	Mrs. Watson.
3 Hedge hogs (alive) (*Erinaceus micropus*).	Ahmedabad ..	Mr. R. H. Heath.
2 Do. do. ..	Baroda	Mr. W. E. Jardine.

Contribution.	Locality.	Donor.
3 Sclater's Monals (*Lophopohrus sclateri*), 5 Silver Pheasants (*Gennæus* sp.), 3 Blood Pheasants (*Ithayenes kuseri*), 1 Temminck's Tragopan (*Tragopan temmincki*), 1 Bamboo Partridge (*Arbicola rufogularis*), 1 Imperial Pigeon (*Carpophaga insignis griseicapilla.*)	Burmo-Chinese Frontier.	Mr. Lowis.
Several Bird Skins	Nilambur ..	Mr. A. P. Kinloch.
9 Bird skins and 1 Snake ..	Fyzabad	Mr. F. Field.
1 Fledgeling Hobby.	Simla	Mr. A. E. Jones.
1 Swift (*Chætura indica*) ..	Mt. Abu	Mr. T. R. Livesy.
1 Night Heron (*Nycticorax nycticorax.*)	Bombay	Mr. Counsell.
2 Checkered Water Snakes, 2 Kraits, 2 Green Pit Vipers.	Andamans ..	Mr. F. Wall.
Krait and 1 Tree Snake ..	Shwebo	Mr. W. Walsh.
3 Snakes, 4 Rock Lizards, 3 Skinks.	Chilas ..	Capt. C. T. Daukes.
2 Snakes	Hissar	Mr. C. E. Branford.
6 Snakes, 2 Frogs and 1 Skink.	Bangkok, Siam ..	Dr. Malcolm Smith.
4 Lizards and several Insects.	Nasik	Mr. N. B. Kinnear.
Moths and Butterflies .	Ladak	Major Kirby.

Minor contributions from Mr. C. H. Dracott, Capt. Sheppard, Mr. Rigby, Mr. C. Fisher, Mr. S. H. Prater, Capt. A. Wilson, Capt. Gharpurey, Major Browne, Mr. Gordon-Ralph and Dr. Bayley de Castro.

JOURNAL

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THE GAME BIRDS OF INDIA, BURMA AND CEYLON.

BY

E. C. Stuart Baker, F.L.S., F.Z.S., M.B.O.U.

Part XVII.

With Plate XVII.

Turnix tanki tanki.

The Indian Button Quail.

Turnix tanki.—(Buch. Ham.) Blyth, J. A. S. B., xii, p. 180 (1843); Ogilvie-Grant, Ibis (1889), p. 466; Oates, in Hume's Nests and Eggs, 2nd ed. iii., p. 370; Ogilvie-Grant, Cat. B. M., xxii, p. 544; Blanford, Avifauna, B. I., iv, p. 153; Oates, Game Birds of India, i, p. 63; Sharpe, Hand-List i, p. 49; Oates, Cat. Eggs, B. M., i, p. 72; Le Mess, Game, S. and W. B. of Ind., p. 115; Oglivie-Grant, Game B., ii, p. 278; Seth Smith, J. B. N. H. S., xvii, p. 238; Whitehead, *ibid*, xx, p. 969; Moss King, *ibid*, xxi, p. 101; A. E. Osmaston, *ibid*, xxii, p. 544.

Hemipodius joudera.—Hodg., in Gray's Zool. Misc., p. 85; E. A. Butler, B. of Sind, etc., p. 56.

Turnix dussumieri.—Blyth, Cat., p. 256; Jerdon, B. of Ind., iii, p. 599; Godwin-Austen, J. A. S. B., xliii, pt. ii, p. 174.

Turnix joudera.—Gray, Cat. M. and B. Nepal, p. 129 (1846); Ball, Str. Feath., iv., p. 236; Butler, *ibid*, p. 8; Hume, *ibid*, p. 225; Butler, *ibid*, v., p. 231; Ball, *ibid*, vii, p. 226; Butler, Cat. B. of Sind, p. 56; Hume and Marsh., Game B., ii, p. 187; Butler, Cat. B. of S. Bomb., p. 70; Reid, Str. Feath., x, p. 64; Davidson, *ibid*, p. 318; Davison, *ibid*, p. 412; Macgregor, *ibid*, p. 441; Terry, *ibid*, p. 479; Taylor, *ibid*, p. 479; Barnes, B. of Bomb., p. 318, *id*, J. B. N. H. S., vi., pt. i.

Turnix albiventris.—Hume, Str. Feath., i, p. 310; *id, ibid*, ii, p. 281; *id, ibid*, iv, pp. 279-293; *id*, Cat., No. 834 ter.; Hume and Marsh., Game B., ii, p. 199; Ogilvie-Grant, Cat. B. M., xii, p. 445; Blanford, Avifauna, B. I., iv, p. 154; Oates, Game B., i, p. 66; Sharpe, Hand-List, i, p. 49; Le Mess, Game, S. and W. B. of Ind., p. 115; Ogilvie-Grant, Game B., ii, p. 280.

Vernacular names.—Lowa (*Upper India*), Pedda dabba gundla (*Telegu*). In most places the natives do not distinguish between this bird and the Common Bustard Quail.

Description : *adult female.*—From forehead to nape barred buff and brown, with indications, sometimes well defined, of a buff mesial stripe; nape, neck, and extreme upper back bright ferruginous red: remainder of upper parts, including inner wing coverts and innermost secondaries, greyish brown, occasionally an almost vinous tint, profusely barred with fine wavy lines of deep brown or dull black, giving these parts a vermiculated appearance, remaining wing coverts buff or brownish buff with a broad sub-terminal drop or short bar: inner secondaries like the back, and those next them more or less freckled with rufous near the tip, and with black and buff on the outer web near the tip, primaries, outer secondaries and primary coverts greyish brown edged with buff on the outer webs, edge of shoulder buff. Below from chin to upper breast reddish ferruginous albescent, and often pure white on chin and throat, and of the same colour on the upper breast as on the neck, these parts forming a broad collar : remainder of lower surface buff, deepest on the breast and flanks, and sometimes almost pure white on the centre of the abdomen; the breast next the collar in the centre, the sides of this and the rest of the breast and flanks nearly as far down as the thighs with large, round or crescentic spots of black.

Females, adult but not so old, as that above described, have the mesial line more strongly marked, the sides of the head are often much marked with rufous, and the black barring is very broad and prominent : the whole of the upper parts are much more heavily spotted and barred with black: the scapulars, and sometimes the back also, have drops of buff, succeeded by black on the outer webs of the feathers, sometimes becoming buff streaks on the former; the inner secondaries and the wing coverts are a purer buff, and the black drops or bars are far more numerous; the inner secondaries also as a rule have a good deal of rufous mixed with the vermiculations. Below, the colour is much like that in the description already given of the older female, but the grey-brown colour of the back often encroaches on the sides of the breast, the black markings are more numerous, and are occasionally mingled with pale buff spots. The chin and throat are nearly always paler, and almost, if not quite, white, and the buff of the belly is whitish, the centre of the abdomen being often pure white.

Colours of the soft parts.—Bill, fleshy white, greyish white, or pale plumbeous, always with a yellowish tinge at the base, and sometimes darker and brownish on culmen; legs and feet yellow fleshy or fleshy grey, sometimes with a tinge of orange; claws the same; irides straw colour or white, probably always white in old birds.

Measurements.—Length about 6·5″ (= 165 mm.), tail about 1·5″ from vent (= 38·1 mm.), tarsus rather under 1·0″ (=25·4 mm.), bill at front about ·5″ (=12·7mm.), and from gape about ·7″(=17·8mm.). The wing in a series of about 40 birds (including the so-called *albiventris*) varies from 3·10″ (= 78·7mm.) to 3·52″ (= 88·9mm.) with an average for *tanki* of 3·43″ (= 87·1mm.), and for *albiventris* of 3·16″ (= 80·2mm.), though some of the *tanki* females are smaller than the largest *albiventris*.

Mr. D. Seth Smith has a most interesting article on this Bustard Quail in the Avicultural Magazine of 1903 (pp. 317 *et seq.*), and from what he records it would really appear that the nuchal red collar is only assumed by the female during the breeding season. He says:—

> "It will be seen from the coloured illustration that appears with this, that in *Turnix tanki* the rufous nuchal collar is a very well marked feature of the female, and my two examples of this sex, when obtained on the 24th of October last, were in perfect full colour. However, as the winter approached, they commenced to moult, and *the collar was completely lost*, the plumage becoming apparently similar to that of the male, though I did not handle the birds to examine them minutely. The two females at this time exactly resemble some specimens in the series at the Museum, which are labelled immature, but which, I am now led to suppose, are really adults in winter plumage. Another fact which tends to prove this conclusion to be correct is, that a young female whose history I am about to relate, had developed a perfect rufous nuchal collar, at the age of six weeks.
>
> "In March the females gradually regained their rufous collars."

Adult male.—The adult male is similar to the first stage adult female, but entirely wants the chestnut collar, the centre of the breast is a paler, duller rufous buff, and the general appearance of the upper parts is less bright, though the vermiculations are larger, in places becoming almost bars.

The younger male resembles the second stage of female described but has no rufous collar. The colours of the soft parts are the same as in the female, but the bill is said to be brown on the culmen and at the tip. I have not noticed any difference myself between the bills of males and females.

Measurements: males.—Length about 6·0″ (= 152·4mm.); tail from vent about 1·3″ (= 33·0mm.); bill at front about ·45″

(= 11·4mm); and from gape about ·65″ (= 16·5mm.); tarsus a little over ·8″ (= 20·3mm.); the wing in a series of about 25 birds varies from 2·82″ (= 71·6mm.) to 3·12″ (= 79·2mm.), and there is one bird sexed as male in the Museum Collection with a wing of 3·30″ (= 83·8mm.); excluding this, the average wing measurements for *tanki* is 3·06″ (= 77·7mm.), and for *albiventris* 2·94″(=73·7mm.), though, as in the females, the largest *albiventris* is bigger than the smallest *tanki*.

Quite young females have the nuchal collar very indistinctly shewn, and are plentifully spotted with white, and the feathers of the upper part are profusely barred with dull black. The white and buff markings of scapulars, and inner quills are almost entirely wanting, being represented only by a few pale spots on the outer webs of the quills and coverts. The primaries are margined and freckled with dull rufous on the outer webs, and the other secondaries have a pale margin and blackish sub-margin to the outer webs which are much freckled with dull rufous. The under parts are duller than in the adult, and are less boldly spotted with black and rufous.

The nestling closely resembles that of *Turnix pugnax pugnax* already described.

Hitherto *Turnix albiventris* from the Nicobars and *Turnix blanfordi* have both been treated as good species, but after a very careful examination of all the material at my command, I cannot discover any difference between *T. tanki* and *T. albiventris* upon which it is possible to make the one a different species or even subspecies to the other. The alleged differences according to Ogilvie-Grant between the two are as follows:—

1. *Albiventris* is smaller, having a wing of 3·2″ as against 3·4″ in *tanki*.
2. It retains the rufous feathers in the back in old age.
3. It has the nuchal collar wider, and of a deeper rufous.
4. *Albiventris* has the upper parts blotched and vermiculated with black like *blanfordi*, and the markings of the head like *tanki*.

Blanford gives the following differences between the two:—

1. *Tanki*.—Adults retain much of the black and rufous barring and mottling on the dorsal feathers.
2. The feathers on the side of the crown are black with rufous edges in *albiventris*.
3. The collar in the female *albiventris* is much darker and broader than in *tanki*.

Thus, Blanford only adds one more difference, that of the head, to the differences alleged by Ogilvie-Grant. We have therefore five alleged differences to deal with.

In the British Museum we have seventeen females of *Turnix tanki*, and eight of the supposed *T. albiventris* for purposes of examination, and I have also examined birds from other collections.

1. As regards size, I find that the average wing measurement of *tanki* is 3·43″ for the female, and 3·06″ for the males, whilst that of *albiventris* is 3·16″ for females, and 2·94″ for males. At first sight this would seem to prove that the two are separable as sub-species on account of size, an examination of individuals, however, disproves this. Thus, in the small series of eight *albiventris* in the Museum Collection, I find two birds with wings of 3·30″ and 3·20″, and in the series of seventeen *tanki* there are four with wings of 3·30″ or under, of these one has a wing of only 3″, and is possibly wrongly sexed, but there is yet another with a wing of only 3·15″. Thus, with two small series containing birds which overlap in size to such an extent, it is impossible to accept an *average* difference of measurement as sufficient grounds for division into species or sub-species unless there are other and better differences with which to support it.

2. As regards the nuchal collar, I must premise my remarks by pointing out that some of the adult birds in the British Museum series labelled *tanki* have their necks so injured that the red collar has practically disappeared; on the other hand, of the seven adult *albiventris*, no less than five have their necks drawn out and so arranged that the width of the collar is exaggerated. The other two if compared with the best specimens of *tanki* will not be found to differ to any appreciable extent in width. As regards colour, it would also be easy to select two *tanki* to put with these two *albiventris* so closely resembling each other in this respect that no one could name them except by chance.

3. As regards the colouring of the upper parts, I consider this only individual; thus, there is a specimen of *tanki* from Allahabad (No. 89.5.10.445) which has more rufous on the back than any specimen of *albiventris*. Again, there are many specimens of young *tanki* which have the back as much mottled with black as the young *albiventris* have. Therefore, the only difference left as regards the colouration of the back is the allegation that *albiventris* never assumes the vermiculated unblotched appearance of *tanki*. But this stage of plumage appears only to be assumed by *very* old females, and is quite exceptionable. In the Museum Collection I find only two such specimens of *tanki* and of the many hundreds of these birds which have passed through my hands, I do not think that I have seen half a dozen birds in this, so-called, adult female plumage. With the few *albiventris* available for examination,

it cannot be said that we have enough material to lay it down as a demonstrated fact that *albiventris* does not ever assume this plumage.

4. Next we have Blanford's assertion that in *albiventris* "the feathers on the sides of the crown are black with rufous edges" and the attendant inference that this is never so in *tanki*. This again is an individual character and the specimen of *tanki* from Allahabad, to which I have already referred, will be found to have this phase of plumage quite as strongly marked as it is in most of the specimens of *albiventris*. Again, if we examine the head of specimen No. 89.5.13.129, an *albiventris* from the Nicobars, we shall see that this bird has far less black on the head than the majority of *tanki*.

I think, therefore, upon consideration of the points of difference brought forward, and a very careful examination of the skins available, there are not sufficient grounds to justify the Nicobar bird being named even as a sub-species, far less to make it a good species.

Distribution.—The Indian Button Quail is found over practically the whole of India, but it does not, apparently, occur in Ceylon. Hume received specimens from South Travancore, I have had specimens sent me from near Tinivelli in the extreme South of Madras, and also specimens from Mysore, whence it had not previously been recorded. In the North-West it straggles into the Punjab, but probably only during the rainy season; it is found throughout Bombay and the North-West Province, and thence East everywhere as far as Calcutta. In the furthest North-East it extends throughout the Assam Valley to Dibrugarh and Sadiya, but South of the Brahmapootra Valley it is replaced in most parts by *Turnix blanfordi*, though a specimen from Tippera in the Hume Collection is nearer *T. t. tanki* than *T. t. blanfordi*. I never came across it either in the Cachar Hills, Khasia Hills or Surma Valley, and I think I may say, it does not occur there. It ascends the Hills to a considerable height, for it has been found in the Nepal Hills up to 4,000 feet; Finn found it in Darjeeling at over 6,000; in native Sikkim it has been obtained up to 7,500 feet (in the month of June) and in the Travancore Hills and Palnis up to 4,000 feet; finally, it occurs commonly in the Nicobars and also in the Andamans.

Nidification.—Wherever the Indian Button Quail is found, it breeds, but there is curiously little recorded, so far, as to its habits in this respect in a wild state.

Hume records eggs taken on the 15th of July and 26th of August, and there are others in the Hume Collection in the British Museum taken on the 29th of April, and one in June. From Bengal and Behar I have eggs taken in May and June, but the normal months

are July, August and September, Dibrugarh in July and August, Gaohati, May and June, and Tezpur, June. There appear to be no records of its breeding in any of the cold weather months from November to March, and it would really seem as if this Hemipode, unlike others of the genus, except *T. tanki blanfordi*, really had a regular breeding season, commencing as a rule with the break of the rains in the middle of June, and continuing until early October.

The few nests I have personally seen were just like those of the Common Bustard Quail, and like that bird's, the nest is sometimes roughly domed, sometimes a well made pad, and sometimes a rather meagre affair of grass and roots in some natural hollow.

The nest is placed in much the same sort of position as is that of its relations already described, but I think it adheres more closely to grass-land for nesting purposes, and also it likes grass which is rather thin and scanty with ample room to run about in.

All Hemipodes, in India at all events, are very easy birds to keep in captivity, and some Aviculturists at home have also been very successful with these birds, and have obtained much information of great interest as to their polyandrous habits.

Mr. Seth Smith in the article, to which I have already referred, gives a most interesting account of this bird's breeding habits in captivity:—

> "The pair," he relates, "as a rule, keep fairly close together, but otherwise appear to take very little notice of one another. As the days lengthened they seemed to become somewhat interested in a certain corner. The hen would sometimes squat in this corner with her breast on the ground and her tail pointing upwards, and made a peculiar soft clucking noise. The cock would then go and take his turn in the same corner, the hen having moved out. At this time, the hen would often be seen rocking her body backwards and forwards in a peculiar manner, but I saw nothing approaching actual nuptial display by either sex, in fact, they seemed to regard one another almost with indifference, except when I threw a mealworm to the hen, when she would generally (though not always by any means) hold it in her bill, and stretching out her body, remain motionless, glancing sideways at the male, until he ran up and took it. Probably she actually called him, though I could detect no sound. At any rate, she presented tit-bits to him, precisely the same way as he, later on, presented food to his chicks."
>
> "Just as the males of other Gallinaceous birds will pick up dainty morsels and gallantly present them to their wives, here we have a case in which the order is exactly reversed, the females, most unselfishly, presenting the most attractive morsels to their husbands.

"On April 24th a slight nest of hay was observed in the above mentioned corner, and on the following day I discovered one egg in the nest. On the 27th a second egg was laid, and a third on the 28th, on which day the male began to sit, and, although the nest was in a perfectly open place, and I was obliged to disturb him each morning as I went to feed the birds, he continued his task in a most praiseworthy manner, and, on May 10th, hatched all three eggs, incubation having been completed in the incredibly short space of twelve days.

"From the day she laid her third egg, the female appeared to take no notice whatever of the nest, and even when the young were hatched, apparently ignored the presence of both her mate and offspring. In fact, I found that she ate most of the food that was provided for the chicks, and so shut her in a separate place.

"The little cock took the greatest care of his charges, brooding them most tenderly, and attacking any living creature, including myself, that might approach them too closely. He would pick up minute insects and hold them in his bill until the chicks came and picked them from him, and, for the first day or two, the chicks, so far as I was able to observe, never picked up food for themselves."

As with all other Hemipodes the full clutch of eggs laid is four, and I have never seen a greater number than this or a smaller number, which showed signs of incubation.

The eggs, except in size, agree in every detail with those of *Turnix taijoor taijoor*, but on the whole are possibly rather more boldly coloured. The specimens with big, bold blotches are decidedly common, though the majority are merely profusely stippled and speckled with reddish or greyish brown, with a few quite small dots and spots of black or blackish.

The Museum eggs vary between ·85″ (= 21·6mm.) and ·9″ (= 22·8mm.) in length, and are ·75″ (= 19·0mm.) in breadth. 40 eggs, including the above 7, of which I have the measurements, vary in length between ·82″ (=20·8mm.) and ·95″ (=24·1mm.) and in breadth between ·71″ (=18·0mm.) and ·81″ (=20·6mm.), and they average ·88″ × ·76″ (=22·3 × 19·2 mm.).

Habits.—The Indian Button Quail frequents much the same kind of country as does the Black-breasted Bustard Quail and the Little Button Quail, but is, on the whole, even less fond of dense forest than are these birds, and prefers grass lands to bush jungle, though often found in the latter. It also frequents all kinds of crops, from the lowest to the tallest, such as sugarcane when dry, and the young jute before it has been flooded. Nowhere, that I have heard of, can this bird be said to be common, and one or two in the course of a long day's shooting is all that is usually met with.

Perhaps the most favourite haunt of this little Button Quail is thin thatching grass on the edge of dry cultivation. Hume's experience was much the same as mine, for he says that in the North-Western Provinces, Oudh and the Central Provinces, he found them much wedded to grass, but he adds that he has known *several* flushed out of patches of grass half an acre in extent. Tickell, writing of this bird, records that it is

> "found scattered about here and there throughout Bengal in open, sandy, bushy places in and about jungles or fields and dry meadows in cultivated country; frequently in low gravelly hills of *Kunkur* (nodular limestone)."

So also Jerdon.

> "This species is found in open grassy glades in forests or jungles, both on the plains, and more especially in the hilly countries, and is also found in grass jungles throughout Bengal, and the countries to the Eastward. It is always seen singly, in patches of long grass or thick cultivation, flying but a short distance, and is very difficult to flush a second time."

It is an even greater skulker than the Bustard Quail, and though like this bird in manner of flight, it is not so strong or noisy on the wing, and drops even more quickly into cover. Hume says that

> "it rises only when you are about to step on it with occasionally a low double chirp, barely audible to my ears. . . It glides bee-like through the air for a few paces, just skimming the waving tops of the grasses, and drops suddenly as if paralysed, almost before you can bring your gun to the shoulder."

They feed both on grain, grass seeds, green shoots of crops, etc., and on insects, more especially ants. Their flesh is not bad to eat, though rather dry unless very fat. Tickell, however, considers them "most delicious, and when in good plight as fat and delicate as an ortolan." Hume, on the other hand, "always found them insignificant, dry, insipid little things."

TURNIX TANKI BLANFORDI.

The Burmese Button Quail.

Turnix blanfordi.—Blyth, J. A. S. B., xxii, p. 80 (1843); Blyth and Walden, B. Burma, p. 151; Ogilvie-Grant, Cat. B. M., xxii, p. 542; Blanford, Avi., B. I., iv, p. 155; Sharpe, Hand-List, i, p. 49; Oates, Game B. Ind., i, p. 68; Le Mess, Game, S. & W. B. Ind., p. 115; Ogilvie-Grant, Game B., ii, p. 277; Stuart Baker, J. B. N. H. S., xii, p. 493; Seth Smith, *ibid*, xvii, p. 238; Harington, *ibid*, xix, p. 365; *id*, *ibid*, xx, p. 377; Hopwood, *ibid*, xxi, p. 1215.

Turnix maculosa.—Apud Gray, Hand-List, B., ii, p. 270; Hume & Dav., Str. Feath., vi, p. 452; Hume, Cat. No. 834 bis.; Hume

and Marsh., Game B., ii, p. 183; Bingham, Str. Feath., ix, p. 196; Hume, *ibid*, p. 208; Oates, B. Burma., ii, p. 335; Hume, Str. Feath., xi, p. 312.

Vernacular names.—Ngôn (*Burmese*), Dao-duma gajao (*Cachari*), Iniruibuma ghéhérta (*Naga*).

Description, adult male and female.—

> "This is but a little more than a large race of *T. tanki*, but, besides their greater size, adults are distinguished by being darker and by retaining a larger amount of black barring on the back; the sides of the crown too are darker. In immature birds the pale edgings to the dorsal feathers are conspicuous." (Blanford.)

Colours of the soft parts.—In the male the bill is pale horny brown, with a tinge of yellowish flesh colour or yellowish at the base of the maxilla, and on the mandible, tip and apical half of culmen a darker brown; legs, feet and claws yellowish, in some cases rather fleshy, and in some a more distinct Chinese yellow. Irides white.

In the female the bill is paler and more yellow; according to Hume "lower mandible, gape and base of upper mandible chrome yellow."

Hume gives the measurements of two birds as follows:—

> "*Male.*—Length, 6·5"; expanse, 12·0"; tail from vent, 1·5"; wing, 3·62"; tarsus, 1·0"; bill from gape, 0·75"; weight, 2·25-oz.
>
> "*Female.*—Length, 7·0"; expanse, 13·5"; tail from vent, 1·5"; wing, 4·12"; tarsus, 1·05"; bill from gape, 0·75"; weight, 2·75-oz."

Oates gives the measurements as being:—

> "Length, 6·5"; tail, 1·6"; wing, 3·5"; tarsus, 0·9"; bill from gape, 0·75"; the female is much larger, the wing reaching to nearly 4" in length."

I have now examined a comparatively large series of this sub-species, including 21 males and 25 females in the British Museum Collection, and I cannot find that any of the alleged differences in colouration between *tanki* and *blanfordi* mentioned by Blanford hold good.

It is quite true that as a body the Eastern form is darker than the Western, but individuals can be obtained in either sub-species to agree with specimens in the other.

There is, however, so great a difference in the size of the two birds that this is quite sufficient in itself to constitute the Eastern and Western forms as good sub-species.

The average length of wing in *T. t. tanki* is 3·43" (=87·1mm.) whereas in *T. t. blanfordi* the same average measurement is no less than 3·93" (=99·8mm.), a full half inch difference. The same

measurements for the males are 3·06″ (=77·7mm.) and 3·53″ (=89·6mm.) respectively.

Even in these two sub-species, however, certain individuals approach one another in size, though they do not overlap as the different forms of *pugnax* do. Thus the largest *tanki* has a wing of 3·52″ (=88·9mm.), whilst the smallest *blanfordi*, a bird from Chefu, has a wing of 3·64″ (=9·24mm.).

Oates, in the "Birds of British Burmah", writes:—

> "The plumage of both is identical"

and Hume remarks:—

> "So far as plumage goes, both these species and *joudera* (*tanki*) are inseparable. At any rate, nine out of ten variations in tint, amount and extent of markings, etc., in this species (*blanfordi*) can be exactly matched in specimens of *joudera* and *vice versa*."

Distribution.—The Burmese Button Quail extends throughout the whole of Burmah as far South as the South of Tenasserim through the Shan Hills, Siam, China, throughout the West and South, as far as Manchuria in the extreme North-East and from Burmah to N. E. India.

Within our limits it is found throughout Burmah, Shan States, Chin Hills, Lushai Hills and thence through the Chittagong Hill Tracts, Hill Tippera, and N. Cachar Hills into the Khasia Hills. It is also found in the Plains districts of Chittagong, Comilla, Sylhet, and Cachar, though a bird collected by Tickell in Tippera was a true *T. tanki tanki*. In the Naga Hills also the typical form takes the place of *blanfordi* and the Cachar Hills and Manipur seem to be the limit of the latter to the North-West.

Nidification.—Needless to say, the hens are polyandrous, or bigamistic would be better, as they only have one husband at a time, though the time is very short.

As a general rule, the nest and eggs of *Turnix t. blanfordi* cannot be distinguished from that of *T. p. plumbipes* but probably on the whole is not so well and compactly built, not so well finished off, and not so often domed. Moreover, twice I have taken its nest in open bamboo jungles, at the foot of one of the clumps, well hidden, but the nest consisting of little more than a pile of the leaves and roots of bamboos in a hollow in amongst the roots.

In the Khasia Hills the birds frequent the great open grass plains so common in these hills, and will seldom, if ever, be found in the Pine Forests or evergreen jungle in the wetter nullahs. Their nests also therefore will be found almost exclusively in grass, though on rare occasions one may be found in a stony ravine with bush jungle in it.

If a clutch of hard set eggs is found, the vicinity should always be carefully searched for another nest as the hens directly they have

laid the fourth egg of one clutch, obtain another male and again start laying. The eggs take less than a fortnight to hatch, but before one set of chickens are ready to appear, she is generally laying again, and as a rule, somewhere quite close to her first clutch.

The regulation number of eggs is, of course, four, and as regards appearance and size there is nothing to add to the description of the eggs of *T. pugnax plumbipes* from which it is impossible to discriminate them, though the eggs of Blanford's Button Quail average much larger. I have one clutch which averages 1·08″ × ·86″ (= 25·6 × 23·8 mm.), another 1·15″ × ·92″ (=29·3 × 25·3 mm.), and a few others about the same. The average is 1·02″ × ·83″ (=25·9 × 23·1 mm.). This sub-species, unlike *plumbipes*, does, however, seem to have a definite breeding season, and in Cachar and the Khasia Hills they commence breeding at the end of April, and continue until the end of August, a few extra energetic hens continuing to lay as late as the end of September.

There is very little on record about this form of Button Quail, but, of course, its habits differ in no way from those of the other sub-species.

Davison, as quoted by Hume, says :—

> "I have always found this species about gardens or in the immediate vicinity of cultivation, but it is very rare, being only occasionally met with, and always singly or in pairs. It is hard to flush, and only flies a short distance before again dropping, but it then runs a considerable distance before halting, and thereafter lies very close. It feeds like other Quails in the mornings and evenings, lying hidden during the heat of the day. On cloudy or rainy days it moves about all day. I do not know the call of this species."

Oates writes about this bird to much the same effect :—

> "This Quail is invariably found about gardens in the jungle singly or in pairs. I have shot it also in bamboo jungle where there was an undergrowth of grass. It is less common on the hills than in the plains. On the whole this is perhaps the most abundant and universally distributed of all the Quails of Burmah, but nowhere will enough be found together to furnish sport."

In North Cachar the Burmese Button Quail is almost common, and they are also to be found in some numbers on the Khasia Hills, but everywhere else in India it is a comparatively rare bird, and—contrary to Oates' experience—everywhere it appears to be much more rare on the plains than on the hills. It ascends to a good height, and in N. Cachar I came across it at Laisung and Boro Ninglo, both villages with much scrub and grass land between them and the forest, at elevations of about 5,000 feet. A Khasia also

trapped me a specimen, a male on its eggs, on the Shillong Peak, which is about 6,000 feet. As a rule, though, in both these districts the birds do not wander much over 4,000 feet, and only as high as this in the hot weather.

In N. Cachar I found it occasionally in grass lands or in bamboo jungle with light undergrowth, but, more often in the dense secondary growth, which grows very rapidly on all deserted ex-cultivated land. Out of such jungle I got several of these birds when beating for Jungle Fowl. On the wing it is impossible to discriminate between the Button Quail and the Bustard Quail, so that until I had picked the bird up, I could never say which it was. As a rule they would just fly across the path where I stood awaiting the beaters, and then make their headlong dive into the jungle on the far side. Being then loaded with big shot, it was useless firing, but the beat over, I would sometimes have the jungle again beaten, and then my gun being loaded with No. 10, would often get a shot as the small birds footed it, at racing pace, across the open. As a rule I found I had bagged a Bustard Quail, but every now and then one of these would be picked up.

My own impression is that the Burmese Button Quail is not hard to flush the first time he is disturbed. True, he does not get up until you are almost on him, and if not approached within a few feet, or even inches, will remain quietly where he is, and not rise at all. But he does not *run at first*, and if approached near enough, he always rises and goes away on the wing, but once he has again dropped, he will run great distances and refuse to rise unless absolutely forced to do so. Generally, indeed, if compelled to pass over small open spaces, he will do so on foot in preference to taking to flight.

On one occasion, when waiting for a leopard which used to come and drink at a pool near my house, I was enabled to watch the actions of a cock bird and his three chicks for some time. I was seated on the ground in a comparatively open space in some thin bush jungle which grew round a Cachari village, and shortly after dawn, a cock Button Quail came down to drink, leaving his little family a foot or two behind him whilst he came down to the edge of the pool. The young, which were two or three days old, did not drink, but as soon as the little cock had had his fill he came back and began busily turning over and scratching up the sand apparently hunting for ants. He was so close to me that I could distinctly hear him now and then give a little "chuck," whereupon his children gathered round him, and he would then present one with some insect or other article too small for me to see what it was. As far as I could watch the young ones—they were so quick and restless that they were hard to follow—they picked up nothing themselves, except once, when their parent took them to a heap of

dried cow droppings, and here they seemed to be feeding themselves with something. After feeding for about half an hour, during which they were in and out of sight amongst the bushes, the cock settled down within a couple of yards of me, and gathered his chicks under him, but an unfortunate movement on my part at this moment sent parent and chicks skurrying away into the undergrowth, and I saw no more of them.

They are principally seed and vegetable eaters, but undoubtedly take ants and other small insects as they come across them, and a tame bird I had for a few weeks ate gentles and spiders greedily.

The call of the Burmese Button Quail is, to me, indistinguishable from that of the Bustard Quail, and I could never tell which bird was calling unless they were afterwards put up and shot. They were far less common than the Bustard Quail, and presumably the females cannot meet as often as the hens of that species do, but, when they do come across one another, they fight just as freely. Two hens were once brought to me in camp, in a little split bamboo basket, and the two continued to fight at intervals all day until I eventually released them, one on either side of my hut, whence they boomed defiance at one another until sunset.

(*To be continued.*)

SCIENTIFIC RESULTS FROM THE MAMMAL SURVEY.

No. X.

A.—The Indian Bats assigned to the genus *Myotis*.

BY

Oldfield Thomas.

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In connection with the naming of certain bats obtained during the Bombay Survey by Messrs. Shortridge in Tenasserim, Crump in N. India and Mayor in Ceylon, I have re-examined all the members of the *Myotis* group, and made some preliminary notes on their characters and nomenclature; and these I now venture to publish, imperfect as they are. Practically nothing had been done in this direction since Dobson's Catalogue of 1878, as the publications of Anderson and Blanford were so entirely based on that as hardly to represent any material advance in knowledge.

To begin with I would suggest that as a matter of convenience, the sub-genus *Leuconoe*, containing the large-footed members of the group, should be recognised as a full genus, thus dividing one of the largest and most difficult genera of Bats. Not only is there a difference in the size of the foot, but there are even differences in habits between the groups, while the skull of *Leuconoe* has a more or less characteristic shape, which shows that the group is a natural one, difficult as it is to define. The best account of it is that in Mr. Miller's synopsis‡ of the European species of *Myotis*, where the characters of the three species of *Leuconoe*, *dasycneme*, *capaccinii*, and *daubentoni* are placed in contrast with those of the ordinary members of *Myotis*.

I.—Myotis proper.

Myotis myotis group.

Of this group of large grey species, the Indian representative is *M. blythii*, Tomes, of which the Museum contains the type (skin and skull) from Nusserabad (Boys), the type of *Vespertilio africanus*, Dobs. from unknown locality, and a male in spirit from Simla recently presented by Mr. P. T. L. Dodsworth.* It is probable that *M. dobsoni*, Trouess. (*V. murinoides*, Dobs.,) is also a synonym of *M. blythii*.

Myotis formosus group.

Examples of the handsome *M. formosus* are in the Museum from Nepal (Hodgson) (type); Mussoorie (Hutton); Dharmsala

‡ Cat. Mamm. W. Europe, p. 168, 1912.
* See Journ., Bombay N. H. Soc., 1914, p. 740.

(Bombay N. H. Soc.) and Lake Palti, Tibet. Also from Formosa (Swinhoe). *M. rufo-niger*, Tomes, from the Yang-tze is still more richly coloured, smaller, with smaller teeth and a differently shaped skull.

A species which appears to be allied to *M. formosus*, though without the characteristic coloration, is the following :—

Myotis sicarius, sp. n.

General size as in *M. formosus*, but the wing-bones longer. Ears about as in *formosus*, much smaller than in *blythii* or *dobsoni*, inner margin convex below, nearly straight above ; tip narrowly rounded off; outer margin slightly concave above, convex below, with a narrow basal lobe. Tragus rather short, its inner margin straight, outer margin slightly convex, the broadest part near the base of the inner margin ; basal lobule large rounded. Wings from the metatarsus near the base of the toes. Calcar reaching about half-way towards the tail-tip ; a narrow post-calcarial lobule present.

Colour dark-brown above and below, the extreme tips of the belly hairs whitish. Wing-membranes uniformly translucent brown.

Teeth exactly as in *M. formosus*, the small middle premolar similarly crowded inwards above and in the tooth-row, though crushed below. In *M. blythii* the small premolars are uncrowded both above and below. In *M. dobsoni* the " first upper premolar is very small, scarcely visible from without, and not much larger than the second," a condition which does not occur in any *Myotis* I have seen, and possibly abnormal.

Dimensions of the type (not quite fully adult) :—

Forearm 53 mm.

Tail 46 ; ear on inner margin 13·5 ; tragus on inner margin 5·3; third finger, metacarpus 46·5, first phalanx 12·5 ; tibia 21 ; hind foot 10·2.

Skull, front of canine to back of m^3 6·7 ; front of p^4 to back of m^2 4·6.

Hab.—Northern Sikim.

Type.—Immature skin in spirit, B. M. No. 91. 10. 7. 56, collected by L. Mandelli. Presented by W. T. Blanford.

The specimen on which this species is founded was in Mr. Blanford's collection, but was never definitely determined by him. At one time it was supposed to be *M. dobsoni*, but is distinguished from that animal (which probably equals *M. blythii*) by its much shorter ears and feet, and such other characters as distinguish it from the *M. myotis* group, to which *M. dobsoni* was said to belong. From *M. formosus* it is at once separated by the absence of the " dead-leaf " pattern.

Myotis peytoni, Wrought.

A very distinct species, characterised by its considerable size (forearm 45-46 mm., skull length 17-18) and the crushing in of its middle premolars, both above and below. It shows no approximation to *Leuconoe* either in foot or skull.

Myotis muricola, Gray.

Not so common a bat as has been supposed, three out of the four synonyms assigned to it by Blanford being really referable to the *mystacinus* group. *V.* (*Pternopterus*) *lobipes*, Peters, from Arakan is alone correctly placed under *muricola*.

The skull is broader and more solidly built than in the *mystacinus* group, and the teeth, especially the canines, are heavier, and the posterior of the two small premolars is more crowded inwards. There is a narrow post-calcarial lobule.

Bats referable to *muricola* occur from Kashmir through the Himalayas and down further India to Borneo and Java.

Myotis amboinensis, Peters's "*Vespertilio adversus* var. *amboinensis*"† not mentioned in Dobson's Catalogue, is a larger ally of *M. muricola* found in Celebes, Buru, Amboina and Ceram.

Myotis mystacinus group.

To this group are referable quite a number of the names which have been applied to the smaller Indian members of *Myotis*. Thus *siligorensis*, Tomes, *darjelingensis*, Tomes, *caliginosus*, Tomes, *blanfordi*, Dobs., *nipalensis*, Dobs., and *moupinensis*, M. Edw., all seem to be assignable to this group.

How many Indian species there are in it I am not at present able to determine, but all may be distinguished from the European *mystacinus* by the deeper and more sharply defined notch on the outside of the ear. There appear to be at least two distinguishable forms, one with low brain case and the canines of normal size, about as in *mystacinus*, and the other with a high crown and the canines much reduced, especially below. For the first the earliest name is *caliginosus* (syn. *blanfordi* and perhaps *nipalensis*), and for the second *siligorensis* (syn. *darjelingensis*), both represented by their types in the British Museum.

Bats of this group have as yet only been found along the mountainous regions of N. India, not in the South, nor in Ceylon.

II.—Leuconoe.

The genus *Leuconoe* is richer in Indian species than has been supposed, and I find that five different forms may be recognised. Blanford includes four species, but one of these is the European

† MB. Ak. Berl., 1866, p. 460.

M. daubentoni, whose occurrence in India is extremely doubtful, and he gives separate headings to *L. longipes* and *L. megalopus*, which I believe to be identical.

On comparing a co-type of the first of these with the actual type of the second (B. M. Nos. 76. 3. 10. 4 and 73. 4. 16. 1), I find that they are similar in all respects and should undoubtedly be united. The name should be *L. longipes*, Dobs., as I agree with Blanford that Blyth's *Myotis theobaldi* must be set aside as indeterminable.

The types of the latter are lost, and the measurement of the foot, "$\frac{7}{16}$ in." does not agree with that in *L. longipes*, nor, without knowledge of how it was taken, or with what exactitude, can it be fitted to any other species.

The Indian species of *Leuconoe* may be distinguished by their skulls as follows :—

A. Skull length 16 mm. or more. Breadth of brain case over 8 mm.
  a. Middle premolar crushed inwards, less than one-third the size of p^1. Ceylon, Java. ... ... *L. hasselti.*
  b. Middle premolar not or little crushed inwards, at least two-thirds the size of p^1.
    a^2. Larger, brain case less swollen, $p.^3$ about two-thirds the area of $p.^1$ Bombay. ... ... *L. peshwa.*
    b^2. Smaller, brain case more swollen. p^3 nearly equal to p^1. Tibet, Formosa. *L. taiwanensis.*
B. Skull length 15 mm. Breadth of brain case 7·4 mm. Andamans. ... ... *L. dryas.*
C. Skull length 14 mm. Breadth of brain case 7 mm. Kashmir. ... ... *L. longipes.*

Leuconoe hasselti, Temm.

Six skins from Kokopeetchie, Eastern Province, and A' Pura, Northern Central Province, Ceylon, obtained for the Survey by Major Mayor are indistinguishable from authentic Javan specimens of *L. hasselti* in the British Meseum.

There is also in the Museum an immature spirit specimen obtained in Ceylon by Dr. Ontdaatje in 1888.

Leuconoe peshwa, sp. n.

A medium sized dark coloured species allied to *L. horsfieldi*. Size rather larger than in *horsfieldi*. Fur fine and velvety; hairs on shoulders rather less than 7 mm. in length; on hind back

4 mm. Colour above dark sepia brown, darker than in Ridgway; extreme tips of dorsal hairs white, giving an inconspicuous hoary powdered effect. Undersurface pale brown, becoming greyer on belly and greyish-white in inguinal region. Ears rather short, not quite reaching the tip of the nose when laid forward; their inner margin evenly convex, outer slightly concave above, convex below, with a small outer basal lobe. Tragus not long, its inner margin straight, its tip rounded, outer margin convex, with well marked outer basal lobule. Wings to the side of the metatarsus about halfway between ankle and base of the toes. Length of foot going about once-and-a-half in that of the tibia. Calcar fairly long with well-defined tip, practically no postcalcarial lobe.

Skull very similar to that of *L. horsfieldi*, but larger throughout, and the brain case more inflated in the frontal region. Middle upper premolar about two-thirds the size in cross-section of the anterior one, slightly drawn inwards, but not completely invisible from the outside. Below, the corresponding tooth is three-fourths the size of p^1, and stands quite in the tooth-row.

Dimensions of the type:—

Forearm 40 mm.

Skull, greatest length, 16·2; condyle to front of canine, 14·1; basi-sinual length 11·6; front of canine to back of m^3, 5·9; front of p^4 to back of m^3 3·5.

A spirit specimen measures:—

Forearm 40 mm.

Head and body 55; tail 37; ear (inner margin) 13; tragus on inner margin 5·5; tibia 16; hind foot 10·5, calcar 14·6.

Hab.—Poona, Bombay. Alt. 2,000′.

Type—An adult female; skin, B. M. No. 0. 9. 16. 1. Original Number 181. Collected 17th August 1900 by R. C. Wroughton. Another female in spirit.

This species is representative of and closely allied to the Javan *horsfieldi*, Temm., but is browner, more heavily built, with thicker limbs and larger skull. I have been able to compare it with the very fine series of *horsfieldi*, obtained at Tasikmalaja, Java, by Mr. Shortridge during the Balston Expedition. Bornean specimens which may be considered as representing *L. carimatæ*, Miller, have the skull more like that of *L. peshwa*, but have markedly shorter fur.

Leuconoe taiwanensis, Arnb. Chr. L.

A specimen recently obtained from Lake Palti, Tibet, proves quite similar to two co-types of the above *Leuconoe* from Formosa.

Lake Palti is comparatively so near the Indian frontier that I think it advisable to include the species in these notes.

Leuconoe dryas, K. And.

Myotis dryas, K. Anderson, Ann. Mus. Genov. (3) III., p. 37-1907. Andaman Island.

Leuconoe longipes, Dobs.

Syn. *Vesputilio megalopus*, Dobs. (see above).

Besides the characters detailed by Dobson and Blanford, *L. longipes* is at once distinguishable from its allies by the small size of the skull, only 14 mm. in length and 7 mm. across the brain case.

B.—Some Notes on the Viverrine Genus *Hemigalus*.

by Oldfield Thomas.

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Among the specimens obtained for the Survey by Mr. Shortridge in the extreme south of Tenasserim are two adult examples of the handsome banded Viverrine on which the genus *Hemigalus* (commonly misquoted as *Hemigale*) was founded, thus adding to the Fauna of British India a genus not hitherto known to occur there. Elsewhere *Hemigalus* ranges over the Malay Peninsula, Sumatra (including the Pagi Islands) and Borneo, but does not extend into Java.

On looking into the question of the proper technical name of the animal I find that it has almost always been known by the wrong specific name, in addition to the erroneous use of *Hemigale* for *Hemigalus*.

From the synonymy which follows it will be seen that the commonly used name *hardwickii* was invalid from the first, having been previously used for another animal, that the next author who wrote about it—Jourdan—used no Latin specific names, though he gave the genus name *Hemigalus*, and that therefore Gray's name of *derbianus* is the first available, and should accordingly be used.

Hemigalus derbianus, Gray.

Viverra hardwickii, Gray, Spic. Zool., pt. II., p. 9., 1830 (Malacca) *nec Viverra hardwickii* (misprinted *hardwichii*), Less. Man. Mamm., p. 172, 1827.

Hémigale zébré, Jourd., C. R. *v.*, p. 442, Sept. 1837 (no Latin specific name).

*Pardoxurus derbyanus**, Gray, Charlw. M. N. H., I., p. 599, Nov. 1837 (no locality).

Paradoxurus (?) *zebra*, Gray, l. c., Nov. 1837 (based on Jourdan's specimen)

Paradoxurus derbianus, Gray, P.Z.S., 1837, p. 67 (pub. Jan. 22, 1838—see P.Z.S., 1893, p. 437). (Malay Peninsula.)

Viverra boiei, Müll., Tijdschr. Nat. Ges., *v.*, p. 144, 1838. (S. E. Borneo.)

Hemigalus or Hemigale hardwickei auctorum.

*The spelling of the specific name may be taken as Gray first wrote it—for the P.Z.S. of June, 1837—as this was the spelling he afterwards used, even though it was not the first published. The *derbyanus* may be looked upon as a misprint, corrected by its author.

The original *H. derbianus* was said to be from the Malay Peninsula, and on comparing the type (B. M. No. 55. 12. 24. 540, received from the Zoological Society's Museum) with two examples from Johore and Malacca, I find that it agrees remarkably with them in the character of its markings. On the other hand, the two Tenasserim specimens, quite like each other, show a considerable difference from the Malay examples both in pattern and in certain cranial characteristics, and may be looked upon as representing a special subspecies.

Hemigalus derbianus incursor, subsp. n.

Size as in true *derbianus*. Ground colour of back rather lighter and more silvery. Dark markings of nape and shoulders broad, well defined and continuous, those of true *derbianus* being very much broken up; the longitudinal bands continuous with the transverse shoulder bands and only broken by the median light band, which has a small band crossing it on the withers. Other markings apparently as in *derbianus*.

Skull in general as in *derbianus*, but the bullæ larger and more swollen anteriorly, not running forwards to a point, but nearly as broad in front as behind, and forming a rounded oblong instead of a round-cornered triangle.

Teeth rather small; canines slender; inner lobe of p^3 much less developed than in any of the other available specimens of the genus.

Dimensions of the Type, measured in the flesh:—

Head and body 520 mm.; tail 393; hindfoot 85; ear 37.

Skull, condylo-basal length 99; zygomatic breadth 46·5; palatal length 52·5; front of canine to back of m^3 39·5; p^3 6·2 × 3·6; p^4 7·2 × 5·6.

Hab.—S. Tenasserim. Type from Bankachon, Victoria Province.

Type.—Adult male. B. M. No. 14. 12. 8. 115. Original number 4723. Collected 13th January 1914 by G. C. Shortridge. Presented to the National Museum by the Bombay Natural History Society.

The differences in the colour pattern, the size and shape of the bullæ and the development of the inner lobe of p^3 together seem to indicate that the Tenasserim form is subspecifically distinct from that of the Malay Peninsula. Whether the Bornean form—which would have the name *boici*—should also be distinguished from *derbianus* I am not at present able to say.

NOTES ON THE INDIAN TIMELIIDES AND THEIR ALLIES

(LAUGHING THRUSHES, BABBLERS, &c.)

BY

LT.-COL. H. H. HARINGTON, Indian Army.

Part IV.

Family—TIMELIIDÆ.

Group VIII—(*continued*).

SIVA, Hodgson, 1838.

Oates, F. B. I., i., p. 207.

"Siva are birds of handsome plumage. The bill is about half the length of the head, gently curved and notched; the rictal bristles are long, and the nostrils are covered by a membrane; the head is crested. The tail-feathers are very peculiar, the ends being obliquely truncated, and only the two outer pairs are graduated, the other four pairs being of equal length." (Oates.)

Their wings are roundish, the first three primaries graduated, and the 4th, 5th and 6th equal and longest; wing and tail about equal in length; and they have no hairs overhanging the nostrils.

Their range is along the Himalayas, through Burma and Assam to China and the Malay Peninsula.

KEY.

Oates, F. B. I., i., p. 208.

a.	Primaries edged, orange	..	..	*S. strigula* and sub-species.
b.	„ „ blue	..	..	*S. cyanuroptera* „

SIVA STRIGULA, Hodgson.

Siva strigula, Hodgson, Ind. Rev., 1838, p. 89; Sharpe, Cat., B. M., vii, p. 638; Oates, F. B. I., i., p. 208.

Siva strigula and sub-species.

Description.—Lores spotted black and white; a ring of yellowish-white feathers round the eye; forehead and crown orange-brown with an olive tinge; upper plumage slaty-green; middle tail feathers basal half chestnut-red, the end black, tipped white; the others with an increasing amount of yellow on the outer web and tipped yellow, the outermost nearly all yellow; primary coverts black; primaries and secondaries black, outer edge orange at the base, changing to yellow at the ends; tertiaries, chiefly slaty-grey on the outer webs, black on the inner, and tipped with white; ear-coverts speckled greyish to speckled blackish; chin orange; throat white tinged with yellow, and with cresentic black cross bars; a narrow moustachial stripe, and a patch on each side of the head, black; remainder of under plumage yellowish tinged with olive, olivaceous on the flanks.

"Upper mandible dark brown ; lower light greyish-brown ; legs and feet grey ; iris dark reddish-brown." (Hume.)

Birds from Simla are much lighter above than the Sikhim ones.

Birds from the Western Himalayas to Darjeeling have the black at the end of the two central feathers from 23 to 35 mm. in extent from the whitish tip. Sides of the head greyish. Wing, 68-69 mm. Culmen, 12 mm.

*Siva strigula castaneicauda, Hume.

Hume's Siva.

Siva castaneicauda, Hume, Str. Feathers, v., p. 100 (1877); Sharpe,Cat., B. M., vii., p. 639 ; Oates, F. B. I., i., p. 209.

I do not think this a very good sub-species nor does its geographical distribution lead one to expect this. Oates gives it as from Bhutan, the hills east of Toungoo, and Tenasserim. I find that birds from the following localities vary as follows :—

Bhutan and Assam.—Sides of the head darker than the Himalayan birds, the black at the end of the tail from 14-23 mm. in extent. Wing, 68-69 mm. Culmen, 12 mm.

Chin Hills.—Sides of the head similar to the Assam birds ; wing and culmen also the same ; the black at the end of the tail 13-19 mm.

Yunnan and the Shan States.—Sides of the head darker than the Assam and Chin Hills birds ; wing and culmen the same ; the black at the end of the tail 10-16 mm.

Tenasserim.—Sides of the head the same as the last ; the black at the end of the tail 15-20 mm.

Siva cyanuroptera and sub-species.

Key (i).

A.—Under plumage vinous grey.
- *a.* Upper plumage light ochraceous .. .. *S. c. cyanuroptera.*
- *b.* „ „ olive-brown, tinged fulvous. *S. c. wingatei.*

B.—Under plumage white.
- *c.* Forehead blue, indistinctly striped.
  - *a'* Upper plumage fulvous olive-brown .. *S. c. oatesi.*
  - *b'* „ „ dusky olive-brown .. *S. c. sordida.*
- *d.* Forehead brown, with obsolete stripes *S. c. sordidior.*

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* S. strigula malayana, Hartert.

Hartert, Nov. Zoo., ix. (1902), p. 567.

Differs from *S. strigula* from Nepal and Sikhim as follows. The crown is not so bright orange brown, but is duller, darker, more olive-brown. The chestnut colour on the central rectrices extends over about 5/6 of the inner and 4/5 of the outer webs, and the next two pairs are more or less chestnut on the inner webs. The outer pair of rectrices, instead of being yellow with a black base, are black with the tip yellow for about 1 cm. and the outer and inner webs bordered with yellow, except at the base. In most of these characters the new Malayan sub-species agrees with *S. strigula castaneicauda.* It differs, however, from both *S. strigula and S. s. castaneicauda* in its sombre colour ; the under surface being yellowish olive, only an ill-defined central line remaining orange yellow. The undertail-coverts are dull yellowish-olive, instead of yellow. The crown is dark olive-brown.

Wing, 68-69; tail, 70-72; tarsus, 26; bill, 11½ m.

Habitat.—Malay Peninsula.

KEY—(ii).

—	*cyanuroptera.*	*wingatei.*	*oatesi.*	*sordida.*	*sordidior.*
Locality ..	Himalayas to the Chin Hills.	Yunnan, Bhamo Hills, and Shan States.	Byingyi Mt. ..	Tenasserim ..	The Malay Peninsula.
Colour of the under parts.	*Grey*, with a vinous tinge.	*Grey* with a vinous tinge.	*White.* ..	*White.* ..	*White.* ..
Upper plumage.	Bright ochraceous.	Olive-brown with a fulvous tinge.	Olive-brown with a fulvous tinge.	Dusky earthy brown.	Dull sooty-brown.
Head	Blue, stripes very distinct.	Blue, stripes very distinct.	Blue, stripes indistinct.	Blue, stripes indistinct.	Sooty-brown, stripes obsolete.
Wings	Primaries edged dark blue, the *secondaries edged light blue and tipped white.*	Primariesedged dark blue, the secondaries edged light blue *but not tipped with white.*	The edging of the primaries and secondaries the same, a dark blue.	*The same as*	*oatesi.*

SIVA CYANUROPTERA CYANUROPTERA, Hodgson.

Hodgson's Blue-winged Siva.

Hodgson, Ind. Rev., 1838, p. 88; Sharpe, Cat., B. M., vii., p. 640; Oates, F. B. I., i., p. 209.

Description.—Lores, round the eye, and a short supercilium, white; feathers of forehead and crown, with black shafts and whitish edges, the whole washed with blue, some specimens show the white markings on the forehead more distinctly than others, which have a very blue appearance; nape blue; the stripes above the eye more pronounced and bluer; upper-back tinged with bluish or lavender-grey; lower-back, rump, and upper tail-coverts bright fulvous tinged with ochraceous, brightest on the rump and upper tail-coverts; middle tail feather slaty-grey, edged with blue on the outer web, a subterminal black band and tipped with white; the next four pairs of feathers with outer web blue, the inner margined with white; the outermost pair margined black and entirely white on the inner web; primary coverts black; winglet cobalt-blue, and tipped white; primaries cobalt-blue on the outer web; *secondaries pale blue on the outer web, and tipped white*; tertiaries black on the inner web, and fulvous changing to lavender-grey on the outer edge, *and tipped white*; chin, throat, breast, ear-coverts and sides of the head, vinous-grey; flanks darker and tinged with buff; under tail-coverts white. Wing 62-64 mm., tail 68 mm., tarsus 25 mm., culmen 12 mm.

Note.—Birds from the Chin and Naga Hills are slightly larger than Himalayan ones, and are much bluer on the head, and have much less white on the inner webs of the tail feathers, and more fulvous on the tertiaries. Wing, 65-70 mm.

"Bill, grey-horny, brownish about the nostrils, and the base of the lower mandible, yellow; iris, brown; feet, fleshy." (Oates.)

Distribution.—The Himalayas from Naini Tal to Assam, Manipur, the Naga and Chin Hills.

Habitat and Nesting.—[The blue-winged Siva builds a nest which is a small, neat edition of that of *Liothrix lutea*; that is to say it is a small cup made of leaves, grasses, moss and roots, lined with very fine roots and fine

grasses usually of a very dark colour. The majority of nests are found placed in bushes low down, not more than four or five feet from the ground but others may be taken quite high up in tall trees. Wherever it is placed the nest is well hidden, in this respect being very unlike that of the Liothrix which likes its nest to be seen by all the world. For this reason in some places, such as the Khasia Hills, although the birds are equally common only one nest of Siva may be found to ten or twenty of the Liothrix.

In number the eggs vary from 2 to 4, the latter number being most exceptional, two perhaps the most common. The normal egg is a bright pale green-blue in ground colour much the same as that of the Song Thrush, and the markings consist of a very few specks and dots of black or, more rarely, brown or red brown, about the larger end. This type of egg is like that of many of the finches of the *Propasser* group. Other eggs are much paler in ground colour, some indeed practically white and some of the largest eggs of this type or much like small, glossless, eggs of Minla and Liothrix, but the texture is always softer and less glossy.

In shape they are rather regular ovals, very little compressed towards the smaller end.

They average in size about ·70″ × ·52.″—E. C. S. B.]

Siva cyanuroptera wingatei, O. Grant.

The Yunnan Blue-wing Siva.

Siva wingatei, O. Grant, Bull., B.O.C., x., p. 38 (1900); *ibid*, Ibis, 1900, p. 593; Ingram, Nov. Zool., xix., p. 290.

Description.—"Intermediate between *S. cyanuroptera* and *sordida*, resembles the former in the colour of its upper plumage, but is a more olive-brown tinged with fulvous, instead of ochraceous; and differs from that species and resembles *sordida* in *not having the quills of the wing, either white tipped or white margined.*" In the type the winglet is not tipped with white, but this does not hold good with all specimens from Yunnan and the Shan States. Under plumage as in *cyanuroptera*, a vinous grey.

Wing, 66 mm.; tail, 65 mm.; tarsus, 24 mm.; culmen, 13 mm. (Type).

Distribution.—This is a very good sub-species, and has a very extended area; being found from Yunnan to the Bhamo Hills, and the Shan States; birds from the south and the neighbourhood of Fort Stedman show very little signs of striping on the head.

I have eggs from the Shan States presumably of this sub-species. They are exactly like the blue type of *cyanuroptera* already described—E.C.S.B.]

Siva cyanuroptera oatesi, Harington.

Oates' Siva.

Bull., B.O.C., xxxiii., p. 62 (1913).

Description.—"In the British Museum there are three specimens of a Siva collected by the late E. W. Oates, on Byingyi, an isolated hill of 6,200 feet, situated on the edge of the Shan Plateau ('Ibis,' 1894, p. 481).

These three birds are quiet distinct from *S. sordida*, Hume, from Tenasserim, of which there is only one specimen, the type, in the British Museum. The other specimen, from Karennee, which has been referred to that species, differs in the colour of its head.

Adult.—Intermediate between *S. c. wingatei*, O. Grant, from Yunnan and *S. c. sordida*, Hume, from Tenasserim. It resembles the former in the colour of its back and upper plumage in general, being of an olive-brown tinged with ochraceous on the rump, but differs from that species in having the head almost entirely dull blue, showing only faint indications of stripes, which are so conspicuous in *S. c. wingatei*. It resembles *S. c. sordida* in the colour

of its under plumage, which is white, while in *S. c. wingatei* these parts are pale grey with a vinous tinge.

Habitat.—Byingyi Mountain.

Type in the British Museum: Adult. Mt. Byingyi, iii., 94. "E. W. Oates' coll." (Harington).

Siva cyanuroptera sordida,* Hume.

The Dull Siva.

Siva sordida, Hume. St. F., v., p. 104 (1877); Sharpe, Cat., B. M., vii., p. 641; Oates, F. B. I., i., p. 210.

Description.—"Resembles *S. C. cyanuroptera*. Differs in having the back, scapulars, wing-coverts, and the outer edge of the tertiaries earth-brown, not ochraceous; *the winglet is not tipped with white, nor have the quills of the wings either white tips or white margins*; the blue portions of the plumage are much duller." (Oates.)

"Lower mandible, legs, feet and claws whity-brown; upper mandible darker, but still pale brown; iris creamy-white." (Oates.)

There is only one specimen, the type, from Tenasserim, in the Museum, this has the whole under plumage white instead of vinous-grey, the upper back washed with dusky blue, and the inner web of only the outermost tail feather white, the others only tipped with white. The secondaries edged the same colour as the primaries, and not pale blue. Type, male: wing, 62 mm.; tail, 68 mm.; tarsus, 25 mm.; culmen, 14 mm.

Habitat.—Muleyit Mt., Tenasserim.

Lioparus, Oates, 1889.

"*Lioparus* differs from *Schæniparus* and *Sittiparus* (*Pseudominla*) by having numerous hairs overhanging the nostrils, and from *Proparus* by its long rictal bristles, which reach nearly to the tip of the bill, by its broader bill, and by its smaller hind claw, which measures much less than the hind toe." (Oates.)

It has the following characteristics: wing not particularly rounded, the first three primaries graduated; wing and tail about equal, the two outer tail feathers only graduated; nostrils, oval and exposed, and not covered by a membrane; bill small and broad; nostrils overhung by numerous small hairs; rictal bristles well developed; hind toe longer than bill.

Lioparus chrysæus, Hodgson.

The Golden-breasted Lioparus.

Proparus chrysæus, Hodgson, in Gray's Zool. Misc., p. 84 (1844).
Alcippe chrysæus, Sharpe, Cat., B. M., vii., p. 627.
Lioparus chrysæus, Oates, F. B. I., p. 174.

Description.—Lores, forehead, crown, nape, dull black; a ring round the eye, cheeks, and ear-coverts, silvery grey; back, dark ashy with a faint olive tinge; rump and tail-coverts tinged greenish; tail blackish; outer edges of basal two-thirds of tail edged orange; wings blackish, the outer edge of first primaries yellow, inner black; secondaries broadly margined with orange and tipped with white; inner web tertiaries margined white; chin blackish; throat silvery ashy brown; remainder of under plumage bright orange-yellow.

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*Siva cyanuroptera sordidior, Sharpe.

Sharpe, P. Z. S., p. 438, 1887, *ibid*, P. Z. S., p. 276, 1888.
Wings. 59-62 mm.; tail, 75 mm.; tarsus, 23 mm.; culmen, 13 mm.
Habitat.—The mountains of the Malay Peninsula.

Bill, plumbeous; legs, pale fleshy; iris, brown (Jerdon); wing, 50-54. mm.; tail, 50 mm.; culmen, 9 mm.; tarsus, 23 mm.

Distribution.—Nepal to East Naga Hills and Manipur.

Proparus, Hodgson, 1841.

Fulvetta, David & Oustalet, Ois. Chin., p. 220 (1877.)

Proparus, Oates, F. B. I., i, p. 173.

These are a very distinct group of small birds, which only occur at high elevations, and are consequently very local in their distribution. They extend along the Himalayas, from Simla to the higher ranges of Manipur and Burma, and into Yunnan, China and Formosa.

Proparus have the following characteristics: a short rounded wing, the first four primaries graduated; wing and tail about equal, the latter graduated, and in some species rounded at the tips, and in others pointed; a small compressed bill; nostrils covered by a membrane, and overhung by numerous small hairs, and short rictal bristles; particularly long tarsus, and a hind claw as long as the hind toe; plumage remarkably soft and dense; the outer edge of the wing feathers brightly coloured.

In habits they appear to be remarkably Tit-like, going about in small parties, hunting trees and bushes for insects. The nesting of two species only, I believe, have been recorded, the nest being a compactly made cup of grass and leaves, felted with moss, and thickly lined with hair and placed in bushes about four feet from the ground. The eggs are a pale green with sepia markings.

"*Hill-Tits*" is a misnomer for this family, as they have nothing in common with the True Tits (*Parinæ*), and therefore I propose the name "*Fulvetta.*" We have adopted many other Latin names such as "Alcippe, Siva," etc., as there are no English ones which are applicable."

Key to the species of *Proparus*.

Harington, B. B.O.C., xxxiii., p. 59.

A.—A white supercilium.

a. Ear-coverts chestnut or brown.

a^1. White supercilium commencing above the eye.

a^2. Crown reddish-brown, bordered on the sides of the occiput with black .. *P. v. vinipectus.*

b^2. Crown dull chestnut, bordered on the sides of the occiput with reddish-brown .. .. *P. v. austeni.*

b^1. White supercilium commencing at the base of the bill .. .. *P. v. ripponi.*

b. Ear-coverts black. .. .. *P. v. bieti.*

B.—No white supercilium.

c. Crown chestnut.

c^1. Crown bright chestnut, indistinctly bordered with black on the sides .. *P. v. ruficapillus.*

d^1. Crown dull chestnut, distinctly bordered with black on the sides.. .. .. *P. v. sordidior.*

d. Crown grey, tinged with pinkish-brown; mantle brown. .. .. *P. v. cinereiceps.*

e. Crown brown.

c^2 Mantle brown, like the crown.

a^3. Rump brown or tinged with olive.

a^4. Outer webs of inner primary and secondary quills deep black .. *P. guttaticollis.*

b^4. Outer webs of inner primary and secondary quills reddish-brown .. *P. striaticollis.*

b^3 Rump dull ochraceous-orange.

c^4. Area in front of the eye pale pinkish-brown; flanks and sides of the belly dull ochraceous-orange, like the rump .. .. *P. manipurensis.*

d^4. Area in front of the eye blackish; flanks and sides of the belly dull brownish-orange, paler than the rump .. .. *P. formosanus.*

d^2. Mantle dark chestnut, contrasting with the brown of the crown.. .. .. *P. fucatus.*

Distribution.—*Proparus vinipectus*, Hodgson, Simla, Nepal, and Sikhim; *P. austeni*, O.-Grant, Japvo Peak, Naga Hills; *P. manipurensis*, O. Grant. Owen Kulno Peak, Manipur Hills; *P. ripponi*, Harington, Mt. Victoria, Chin Hills, Burma; *P. sordidior*, Rippon, Yunnan, E. of Talifu; *P. bieti*, Oustalet, S. and W. Yunnan; *P. ruficapillus*, Verreaux, Kansu and N. W. Szechuan, China; *P. cinereiceps*, Verreaux, Kansu and N. W. Szechuan, China; *P. fucatus*, Styan, Ichang, China; *P. striaticollis*, Verreaux, N. W. Szechuan; *P. guttaticollis*, La Touche, Kuatun, Fohkien, China; *P. formosanus*, O. Grant, Formosa.

Proparus vinipectus vinipectus, Hodgson.

Hodgson's Fulvetta.

Siva vinipectus, Hodgson, Indian Review, 1838, p. 89.
Alcippe vinipectus, Sharpe, Cat., B. M., p. 619.
Proparus vinipectus, Oates, F. B. I., i., p. 173.

Description.—Lores, dusky; forehead, crown and nape, reddish-brown, a broad white supercilium from just above the eye to the nape, bordered above by a black line on each side of the head which converge together upon the upper back. Back brown with a vinous tinge; rump, wing and upper tail-coverts ferruginous; tail brown washed with rusty-red on the outer webs; primary coverts chestnut; the earlier primaries edged with bluish-grey; the others edged with black, secondaries ferruginous on the outer web: ear-coverts and cheeks like the crown; chin, throat and upper breast whitish with dusky streaks, sides of the breast like the back but paler; abdomen and under tail-coverts dark fulvous. "Bill and legs fleshy brown, iris dark brown to pale ochre; legs and feet livid."

Average of eight specimens, 58 mm., max., 60 mm., min., 57 mm. Females slightly the smaller; tail, 54 mm.; culmen, 10 mm.: tarsus, 25 mm.

Distribution.—Simla, Nepal, Sikhim and Darjeeling.

Note.—Birds from the Western Himalayas (Simla) show a want of markings on the throat, and have the head more brightly coloured, whether this is seasonal or not, it is impossible to say from few specimens in the British Museum.

Proparus vinipectus austeni, O. Grant.

Grant's Fulvetta.

Proparus austeni, O.-Grant, Bull., B. O. C., v., p. 3 (1895); *ibid*, Ibis, 1896, p. 61; Blanford, F. B. I., iv., App., p. 479.

Description.—Similar to *P. vinipectus*, differs in having head dull chestnut and the stripes on the head reddish-brown; chin and throat white; feathers on the throat white with reddish-brown spots. Wing, (Type) 60 mm.; tail, 53 mm.; culmen, 9 mm. Bill in dried skin intensely black.

Habitat.—Japvo Peak, Naga Hills, Assam.

* PROPARUS VINIPECTUS RIPPONI, Harington.

The Chin Hill Fulvetta.

Proparus ripponi, Bull., B. O. C., xxxiii., p. 59 (1913).

Description.—Adult: Similar to *P. austeni*, O. Grant, but differs in having the white supercilium commencing at the base of the bill, and not above the eye; the ear-coverts chocolate-brown and of almost the same shade as the head, instead of very dark brown contrasting with the head. Culmen, 9 mm.; wing, 51-55; tail, 54.

Habitat.—Mt. Victoria, Chin Hills, Burma.

Observation.—There are numerous examples of this bird, collected by Colonel Rippon, in the above locality.

Type in the British Museum: Adult, Mt. Victoria, 19, iv., 04. G. Rippon coll.

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* PROPARUS VINIPECTUS BIETI, Oustalet.

Oustalet's Fulvetta.

Oustalet, Ann. Sci. Nat. (7), xii. p. 304 (1892).

Lores and a conspicuous supercilium to the nape white; the feathers in front of the eye speckled with brownish: above the supercilium two black lines on each side of the head to the nape; ear-coverts, cheeks, and side of the head black, the cheeks edged posteriorly with dark chocolate; forehead, crown, nape and upper back dark earthy-brown with a vinous tinge; lower back, rump and tail coverts ferruginous; wings and tail as in *vinipectus*; chin and throat white; breast vinous grey; abdomen and flanks tinged olivaceous.

Average wing of eight specimens, 59 mm., max. 61. mm., min. 57. mm. Tail, 55 mm.; culmen, 9 mm.

"Iris, light yellow, bill horny colour. Legs and feet pale fleshy." (Rippon.)

Distribution.—South and West Yunnan. The "Hand List" gives Ta Tibet Tsienlou as a habitat.

PROPARUS RUFICAPILLUS RUFICAPILLUS, Verreaux.

Verreaux's Fulvetta.

Siva ruficapilla, Verr., N. Arch. Mus. VI, p. 37 (1870).

Fulvetta ruficapilla, Sharpe, Cat., B. M., vii., p. 629.

Lores and forehead ashy grey; crown and nape chestnut; back vinous ashy; rump and tail-covert bright ochraceous; tail brownish; outer webs the same colour as the rump; the outer webs of the earlier primaries bluish-ashy, the later ones margined with black; primary coverts the same colour as the rump, a ring or white feathers round the eye; ear coverts pale vinous-brown; chin and throat white with indistinct greyish stripes; breast vinous ashy; flanks and abdomen bright fulvous. Female, slightly duller in colouring. Wing: male, 57 mm.; female, 51 mm.; tail, 52 mm.; culmen, 9 mm.; tarsus, 24 mm.

"Iris hazel, bill light brown-yellowish at the base, feet and claws obscure grey." (Sharpe.)

Habitat.—China, West Szechuen and S. Chensi. The only two specimens in the Museum are from Kan-su.

Note.—The tail feathers of this species are pointed.

PROPARUS RUFICAPILLUS SORDIDIOR, Rippon.

Rippon's Fulvetta.

Rippon, Bull., B. O. C., xiii., p. 60 (1903).

Similar to *P. ruficapillus* but duller.

Lores, and in front of the eye greyish, a white ring round the eye; forehead, crown and nape, dull chestnut; a black stripe on each side of the head, with an indistinct greyish supercilium below; ear-coverts greyish-brown; back olive-grey; rump fulvous; outer edge of tail feathers the same; chin and throat greyish with indistinct stripes; breast vinous-grey; flanks and abdomen pale fulvous; outer edge of first primaries bluish-grey, inner black.

Wing, 53-57 mm.; culmen, 9 mm.; bill, brownish; tail, 54 mm.; tarsus, 22 mm.

Legs and feet light flesh. Bill brown, darkest on culmen.

Habitat.—Yunnan, China, Gyi-dzin-shan, east of Talifu, W. Yunnan, 9,100 ft.

† PROPARUS MANIPURENSIS, O. Grant.

The Manipur Fulvetta.

Proparus manipurensis, O. Grant, Bull., B. O. C., vol. xvi., p. 123.
Differs from *vinipectus*, in having no conspicuous white supercilium.

PROPARUS CINEREICEPS, Verreaux.

The Grey-headed Fulvetta.

Siva cinereiceps, Verr. W. Arch., Mus., vi., p. 37 (1870).
Fulvetta cinereiceps, Sharpe, Cat., B. M., vii., p. 628.
Description.—Lores, forehead, crown and nape, grey tinged with pinkish-brown; back, pale brown, rump and tail-coverts olive-yellow, outer edges of tail feather dark grey edged with olive; the earlier primaries edged ashy-blue, blackish on the later; wing-coverts same colour as rump; chin, throat, sides of the neck and breast, vinous-grey; throat with indistinct stripes of greyish; flanks ochraceous. Female, similar to male.
Wing: in male, 61 mm.; female, 57 mm.; tail, 55 mm.; culmen, 9 mm.; tarsus, 25 mm.
Iris light yellow; bill black; feet ashy rufous.
Habitat.—China, W. Szechuan, S. Shensi.
The only two specimens in the Museum are from S. Kansu.

PROPARUS STRIATICOLLIS, Verreaux.

Siva striaticollis. Verr, N. Arch. Mus., vi., p. 38 (1870).
Fulvetta striaticollis, Sharpe, Cat., B.M., vii., p. 629.
Description.—I have not been able to examine a specimen of this species so quote Dr. Sharpe's description.
"Upper parts of the body olive-brown, becoming greyish on the neck, marked with blackish stripes on the head and nape; lower surface of body silk grey, striped with blackish on the throat, and with an olive shade on the flanks; lores black; tail greyish, slightly rounded; wings brown edged with ashy grey on the remiges, with black on the secondary quills, and with olive on the tertiaries. Iris yellowish-white; bill brownish-grey on the upper mandible and whitish on the lower one; feet and claws grey." Total length, 4·8″; tail, 2·5″; wing, 2·5″; tarsus, 9″; bill front 2·5″.
Habitat.—Moupin, W. China. (Sharpe).

PROPARUS GUTTATICOLLIS, De La Touche.

De La Touche, Bull., B. O. C., vi., p. 50 (1897).
Description.—Similar to *P. striaticollis*.
Lores, and round the eye and ear-coverts greyish; forehead, crown, nape and back brownish; an indistinct darker stripe on each side of the nape; rump tinged with fulvous; tail brownish with darker outer edges; wing, earlier primaries bluish-grey, later black, chin and throat greyish-white with greyish-brown stripes; breast vinous grey; flanks pale brown.
Wing: male, 57 mm.; female, 53 mm., tail, 53 mm.; bill intensely black, 9 mm., tarsus, 24 mm.
Habitat.—China, N. W. Foh-kien, Kuatun.

†PROPARUS FORMOSANUS, O. Grant.

Proparus formosanus, O. Grant, Bull., B. C., xvi, p. 120 (1906.)
Wing, 55 mm.; culmen, 9 mm.; tail, 54 mm.; tarsus, 25 mm.
Habitat.—Mt. Morrison, 9,000 feet, Formosa.

PROPARUS CINERICEPS FUCATUS, Styan.

Styan., Ibis, 1899, p. 295.
Similar to *P. cinericeps*, Verreaux.
I have not been able to examine any specimens of this sub-species.

	P. cinericeps.	*P. fucatus.*
Head	Grey.	Earthy brown.
Back	Rufous.	Dark chestnut.
Rump, flanks and under-tail coverts	Olive.	Bright rufous

Habitat.—Ichang, China.

Area in front of eye pale pinkish-brown; forehead, crown, nape and upper back pale brownish with a vinous tinge; a conspicuous chocolate coloured stripe on each side of the head to upper back; lower back, rump, and tail-coverts dull ochraceous orange: the outer edge of the earlier primaries bluish-grey; the later edged black; primary coverts ferruginous, tinged olive; tail brown; the outer edge same colour as back; chin and throat whitish suffused with vinous, spotted with brownish-red; breast vinous-grey; abdomen and flanks dull ochraceous orange, like the rump.

Note.—This interesting little bird has its nearest ally in *P. formosanus*, O. Grant.

Habitat.—Owen, Kulno Peak, Manipur Hills, 8,000 ft.

Four specimens collected by Godwin-Austen.

Wing, 50-56 mm.; culmen, 8 mm.; tail, 47 mm.

GROUP IX.

Stachyrhis.

In this group I have placed the following: *Thringorhina*, *Stachyrhis*, *Stachyrhidopsis*, *Mixornis*, and *Cyanoderma*.

It consists of a large number of birds, the great majority of which do not occur within Indian limits. If the whole group are examined together they grade almost imperceptibly from one into the other, so much so that it is impossible to draw the line between *Thringorhina* and *Stachyrhis*, many members of the latter being of the same size as those of the former. Of the smaller *Stachyrhis*, of the *S. chrysæa*, Hodgson, type, although being structurely similar to the *S. nigriceps*, type, differ greatly in size and coloration, and I think should be placed in a genus by themselves, as they are being continually transferred from *Stachyrhis*, to *Stachyrhidopsis*, and back again.

Stachyrhis and *Thringorhina* are remarkable for being the only *Timeliidæ* which lay spotless white eggs; and have the following characteristics: tail slightly shorter than the wing; feathers of the forehead stiff; rictal bristles short, and no hairs overhanging the nostrils; a stout conical bill, the culmen curved throughout, and hooked at the tip; and the nostrils covered by a prominent overhanging membrane.

S. chrysæa and sub-species are very much smaller than the above, with a finer bill, and have a very bright plumage in which golden-yellow predominates. They generally lay spotless white eggs, occasionally spotted ones are found.

Stachyrhidopsis is remarkable for its sharp conical bill, both the culmen and the lower edge of the lower mandible being quite straight, and not hooked as in the last two genera. They also lay spotted white eggs.

Mixornis has a very marked resemblance to the last in coloration and style of plumage, its bill, however, is quite different, being gently curved, and the nostrils oval and exposed with no covering membrane.

Cyanoderma is noticeable for its naked orbital skin round the eye. It lays spotted eggs, but I can find nothing recorded about its habits or nidification.

Thringorhina, Oates, 1889.

Oates, F.B.I., i., p. 155.

"The two birds for which the above generic name is proposed, in addition to a peculiar style of coloration, are characterised by the very large operculum over the nostril. The bill is very strong, with the culmen gently curved throughout, and the rictal bristles are weak. The feathers of the forehead harsh to the touch." (Oates.)

They also have a short rounded wing, fitting close to the body; the tail shorter than the wing; and no hairs overhanging the nostrils.

The nidification of only one species appears to be known, this builds a domed nest and lays spotless white eggs. In fact its nest and eggs are similar to those of *Stachyrhis*, and I think, is one very good reason for combining the two genera.

Distribution.— *T. oglii*, Godwin-Austen, Assam; *T. guttata*, Tickell, Tenasserim; *T. striolata*, S. Mull., Sumatra; *T. thoracica*, Temm., Java.

Thringorhina oglii, Godwin-Austen.

Austen's Spotted-Babbler.

Actinura oglii, Godwin-Austen, J., A.S.B., xlvi., pt. ii., p. 42 (1877).
Actinodura oglii, Sharpe, Cat., B.M., vii., p. 467.
Thringorhina oglii, Oates, F.B.I., i., p. 156; Baker, Ibis, 1906, p. 100.
Description—As in the F.B.I.

Distribution.—Appears to be a very rare bird confined to the higher ranges of the Naga Hills, Assam. The nidification has been described by Stuart Baker, and shortly, it appears to build a large domed nest, and lays three pure white eggs, measuring from ·86 × ·63 to ·91 × ·62 inches.

Thringorhina guttata, Tickell.

Tickell's Spotted-Babbler.

Turdinus guttatus, Tickell, Blyth, J., A.S.B., xxviii., p. 414 (1859).
Stachyrhis guttata, Sharpe, Cat., B.M., vii., p. 535.
Thringorhina guttata, Oates, B.I., i., p. 155.
Description—As in F.B.I.

Distribution.—From Muleyit Mt. to the extreme south of Tenasserim. Another rare bird of which nothing appears to be recorded.

Stachyrhis, Hodgson, 1844.

Oates, F.B.I., i.. p. 161.

Very similar to *Thringorhina*, but not quite such a massive bill. This genus is represented within Indian limits by two species, and their sub-species, *S. nigriceps* and *S. chrysæa*. The latter, I think, should be placed in a genus by itself.

Distribution.—*S. n. nigriceps*, Hodgson, Nepal, and Sikhim; *S. n. coltarti*, Harington, Assam, south of the Bramhaputra, the Naga and Chin Hills, the Bhamo Hills, Burma; *S. n. davisoni*, Sharpe, Malay Peninsula, and probably from Tenasserim up to the Shan States; *S. n. lavata*, Bonaparte, Sumatra; *S. n. borneensis*, Sharpe, Borneo; *S. n. natunensis*, Hartert, Natuna Island.

Colouration.—The feathers of the lores and forehead black tipped with white or hoary grey; those of the crown and nape, black or grey, edged with white, giving a striped appearance; in full plumage a conspicuous supercilium of black or dark sooty-brown feathers, edged with grey above and below; ear-coverts brownish; cheeks white; *chin and throat, black, black and white, or grey*; the whole upper plumage olive-brown; the exposed portions of the wings and tail inclined to rufous; lower plumage from fulvous with a yellowish tinge, to rusty-orange.

Stachyrhis nigriceps nigriceps, Hodgson.

The Nepal Black-throated Babbler.

Stachyrhis nigriceps, Hodgson, Gray's Zool. Misc., p. 83 (1844); Sharpe, Cat., B. M., vii., p. 532; Oates, F. B. I., i., p. 162.

Description.—Lores and forehead black and white; *chin and throat grey formed by the feathers being a dark grey or black edged with white*, giving a slightly mottled appearance; ear-coverts golden-brown. Wing, 58 to 62 mm.; bill, 15 mm. Bill, lower mandible yellowish, upper horn-coloured.

Distribution.—Nepal, Sikhim, Darjeeling.

Stachyrhis nigriceps coltarti, Harington.

The Assam Black-throated Babbler.

Harington, Bull., B. O. C., xxxiii., p. 61 (1913).

Description.—Adult: Similar to *S. nigriceps*, Hodgson, from Nepal, but ffers in having *the throat very dark grey or black*; in *S. nigriceps* the athers are dark grey edged with white, producing a striped appearance. he measurements are the same as those of *S. nigriceps*.

Habitat.—Dibrugarh, Assam; the Naga and Chin Hills, and the Bhamo Hills. irds from the Shan States and Tenasserim have the throat light ashy-grey, in *S. davisoni*, Sharpe, from the Malay Peninsula, with which they appear be identical.

I have named this sub-species after Dr. H. N. Coltart, who has collected a mber of specimens at Margherita, Assam.

Type in the Tring Museum: ♀. Margherita, 4, xii. 01. H. N. Coltart coll.

* Stachyrhis nigriceps davisoni, Sharpe.

The Tenasserim Black-throated Babbler.

Stachyrhis davisoni, Sharpe, Bull., B. O. C., i., p. 7 (1892).

Description.—Chin and throat ashy grey, and not black and white; lores d forehead hoary grey; ear-coverts hair brown; superciliary streak sooty-own to black, upper plumage tinged with green.

Bill intensely black, bluish below.

Distribution.—The Malay Peninsula, and probably up to Karennee, one ecimen procured at Thandunng (now in the Tring Museum) is, I think, ferable to this sub-species.

Note.—Birds from the Shan States appear to be this sub-species, but differ ghtly as follows: upper plumage with a decided rufous tinge; the chin and roat pale ashy; ear-coverts golden-brown; superciliary streak black with hite edges to the feathers and very conspicuous.

Bill bluish to black below, intensely black above.

Stachyrhis chrysæa.

Colouration.—Lores and in front of the eye, black to yellowish; forehead lden to pure yellow (in *chrysæa* and *chrysops* and *binghami*, a short moustaial streak black); ear-coverts greenish-yellow to the same colour as the ad, and slaty-green in *binghami*; crown and nape bright golden yellow to

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* Stachyrhis nigriceps lavata, Bonaparte.

Bp. Consp., i., p. 217 (1850); Sharpe, Cat., B. M., vii., p. 534.

Lores grey; head sparingly streaked with white; chin and throat grey; bill black.

Distribution.—Sumatra.

Stachyrhis nigriceps borneensis, Sharpe.

Sharpe, Ibis, 1887, p. 449.

Wing, up to 64 mm.; bill, 15 mm., and intensely black.

Distribution.—Borneo.

S. nigriceps natunensis, Hartert.

Hartert, Nov. Zool., i., p. 470 (1894).

Distribution.—Natuna Island.

The following other species of *Stachyrhis* have been recorded:—

S. melanothorax, Temm., Java.
S. poliocephala, Temm., Malay Peninsula, Sumatra and Borneo.
S. grammiceps, Temm., Java.
S. nigricollis, Temm., Malay Peninsula, Sumatra and Borneo.
S. leucotis, Strick, Malay Peninsula, and Borneo.
S. maculata, Malay Peninsula, Sumatra and Borneo.
S. banjakensis, Richmond, Banjak Island, Sumatra.

dull greenish-yellow, with black streaks; upper plumage and exposed pa of the wings, bright olive-yellow to slaty-green ; tail greenish-brown wash with yellow on the outer webs ; lower plumage bright yellow to dull yello

Distribution.—*Stachyrhis chrysæa chrysæa,* Hodgson, Nepal, Sikhi Assam, and also Kachin Hill, East of Bhamo ; *S. c. assimilis,* Walden, S. Sh States and Karennee: *S. c. chrysops,* Richmond, Malay Peninsula a possibly Siam and the Mekong watershed ; *S. c. binghami,* Rippon, t Chin Hills ; *S. c. bocagii,* Salvadori.

* STACHYRHIS CHRYSÆA CHRYSÆA, Hodgson.

The Nepal Golden-headed Babbler.

Stachyrhis chrysæa, Blyth, J.A.S.B., xiii. p. 379 (1844).
Stachyrhidopsis chrysæa, Sharpe, Cat., B. M., vii., p. 601.
Stachyrhis chrysæa, Oates, F.B.I., i., p. 163.

Description.—*Lores and a streak to the eye black* ; forehead brig orange, feathers of the head distinctly striped with black in the centr throat from a rich orange to an orange-yellow (birds from N.-E. Assam a Naga Hills brightest) ; ear-coverts greenish-yellow.

Distribution.—Nepal, Sikhim to Assam, and the Kachin Hills.

STACHYRHIS CHRYSÆA ASSIMILIS, Walden.

The Burmese Golden-headed Babbler.

Stachyrhis assimilis, Walden, Blyth's Birds Burma, p. 116 (189
Stachyrhidopsis assimilis, Sharpe, Cat., B. M., vii., p. 602. Oates, F. B. I.

Description.—Similar to *chrysæa, but no black streak in front of the e* lores greenish-grey ; the stripes on the head indistinct and blurred ; upp plumage greenish-olive to slaty-green ; under parts dull yellow. Bir from the Shan States and Muleyit Mt., Tenasserim, show indications o black streak in front of the eye and so tending towards *chrysops.*

" Above cinerous olive-green. Feathers of the head yellow with bro central streaks, cheeks and ear-coverts, pale brown tinged with yell Entire under surface dilute yellow. Quills, brown edged externally with p yellow. Rectrecies, cinerous-brown tinged with olive-green. Wing, 1·9 Blyth, Birds Burma, p. 116.

Karennee : Male : iris, black ; bill lavender, pink at base of mandib legs brownish-yellow, feet greenish. Female : iris brown, bill dark plumb ous, pink at base of mandible ; legs light greenish-brown." (W.R.)

There are four specimens in the British Museum from Nepal and Assa these are probably the ones referred to by Oates, they are old and fad

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* STACHYRHIS CHRYSÆA CHRYSOPS, Richmond.

Richmond, Proc. Biol. Soc., Washington, xv., p. 157 (1902).

This seems to be very near *S. chrysæa.* All the specimens in the Museum from the Malay Peninsula, and are marked as that sub-species.

Description.—Lores and a black moustacial streak, and under parts *S. chrysæa* ; upper plumage like *assimilis* ; the markings on the head not distinct as in *chrysæa.* Worn specimens are exactly like *assimilis* from Burma.

One bird from Loi Pang Nan, S. S. States near the Mekong, is exactly like Malay specimens, as this locality is on the borders of Siam, it is probably that s species.

STACHYRHIS CHRYSÆA BOCAGII, Salvadori.

Sharpe, Cat., B. M., vii., p. 602, foot-note.

" Above, greenish-olive ; head yellowish, the crown streaked with dusky ; lo dusky ; undersurface of body yellow, the throat brighter, the sides tinged w green ; wings and tail dusky ashy grey, the outer margins of the feathers greeni olive ; bill and feet dusky ; iris chestnut.

Total length, 4·3″; bill, 45″; wing, 2″; tail, 1·75″; tarsus, 66.″ (Salvadori).

Habitat.—Mountains of Sumatra.

skins with no data, and look very like *assimilis* from Karennee, but show the black stripe in front of the eye and are in my opinion nothing but faded specimens of *chrysæa*.

Distribution.—Karennee and the S. S. States bordering Karennee, and Byingyi Hill.

Stachyrhis chrysæa binghami, Rippon.

The Chin Hills Golden-headed Babbler.

Stachyrhis binghami, Rippon, Bull., B. O. C., xiv., p. 84.

Similar to *chrysæa*, differs in having ear-coverts slaty-green; upper plumage as in *assimilis*; under parts dull orange to dull yellow; the black streak in front of the eye present.

Distribution.—Mt. Victoria, Chin Hills.

Stachyrhidopsis, Sharpe, 1883.

Oates, F. B. I., i., p. 164; O. Grant, P. Z. S., 1900, p. 476; and Ibis, 1907, p. 183; Rothschild, Bull., B. O. C., xiv., p. 8.; Hartert, Nov. Zool., xvii., p. 232.

"This genus differs from *Stachyrhis* in having the culmen perfectly straight, and in laying spotted eggs." (Oates.)

They have the following characteristics: a short rounded wing; wing and tail about equal in length; the feathers of the forehead soft and not harsh as in *Stachyrhis*; the bill, small, conical; the upper edge of the upper mandible and the lower edge of the lower mandible quite straight, (very similar to that of the Goldfinch); bill not notched; rictal bristles very short; and no hairs overhanging the nostrils, which are protected by a covering membrane.

In style of plumage they are very similar to *Mixornis*, and consequently may be confused with that genus, they can however be easily separated by their bills. In *Mixornis*, the nostrils are oval and exposed, and the culmen curved, whilst in this genus, the nostrils are covered by a membrane, and the culmen perfectly straight.

The members of this genus build retort shaped nests, of bamboo leaves and grass, which are generally well concealed in overhanging tufts of grass. They lay white eggs more or less spotted with reddish-brown.

This is a very confusing genus of small birds which extend from the N. W. Himalayas to China and the islands of Formosa and Hainan, and also into Burma and the Malay Peninsula.

Key to Species.

a. Crown rufous to chestnut; chin not black.
  a[1]. Throat yellowish .. .. .. *S. ruficeps.*
  b[1]. Throat whitish .. .. *S. rufifrons.*
b. Crown fulvous; chin black .. .. .. *S. pyrrhops.*

(For easier comparison I have tabulated the differences between the geographical races of *S. ruficeps* and *S. rufifrons*.)

Distribution.—*S. pyrrhops*, Hodgson, Himalayas, Murree to Nepal; *S. ruficeps ruficeps*, Blyth, Sikhim and Nepal; *S. ruficeps bhamoensis*, Harington, Bhamo and Shan Hills; *S. ruficeps davidi*, Oustalet, Kwang-tung, Foh-kien, Foochoo, Hunan, Szechuen, China; *S. ruficeps præcognitus*, Swinhoe, Formosa; *S. ruficeps goodsoni*, Rothschild, Hainan; *S. rufifrons rufifrons* Hume, Pegu, Shan States, and Tenasserim, Burma; *S. rufifrons ambigua*, sub-sp. nov., Sikhim and Assam; *S. poliogaster*, Hume, Malay Peninsula.

Note.—*S. sulphura*, Rippon, Bull., B.O.C., xi., p. 11 (1900); Harington, Bull., B.O.C., xxxiii., p. 63 (1913), is not a *Stachyrhidopsis*, but *Mixtornis gularis rubricappillus*, this name therefore becomes a synonym of that species.

KEY.

STACHYRHIDOPSIS RUFICEPS and RUFIFRONS, and their sub-species.

—	*S. r. ruficeps*, Blyth.	*S. r. bhamoensis*, Harington.	*S. r. davidi*, Oustalet.	*S. r. præcognitus*, Swinhoe.	*S. r. goodsoni*, Rothschild.	*S. rufifrons rufifrons*, Hume.	*S. rufifrons ambigua*, Sub-sp. nov.
Type locality. ..	Darjeeling	Bhamo Hills ..	Szechuen	Formosa	Hainan	Pegu, Burma ..	Shillong, Assam.
Bill	Horn coloured ..	Do.	Do.	Do.	Do.	*Black* .. .	Horn-colour.
Lores	Bright yellow	Yellowish	Do.	Bright yellow ..	Yellow	*Whitish*	Yellowish.
Crown and Nape ..	*Bright rufous, extending over the nape.* Black shaft-stripes to the feathers of the forehead, very indistinct or wanting	*Bright rufous, confined to the crown.* Black shaft-stripes very faint.	*Light chestnut, extending to the nape.* No black shaft-stripes.	*Rich dark chestnut, extending to the nape.* No black shaft-stripes.	*Rich dark chestnut which is confined to the crown.* Do.	*Dull rufous which is confined to the fore part of the head.* Black shaft-streaks, indistinct or wanting.	*Bright rufous, which is confined to the crown.* Black shaft-streaks, very conspicuous.
Upper plumage ..	Olive with a decided greenish tinge.	Greyish-olive with a decided greenish tinge.	Olive with a decided greenish tinge.	Dark greenish-olive.	Dark greenish-olive.	Greyish-olive ..	Olive with a greenish tinge.
Chin	Yellowish with black shaft stripes. *The yellow not contrasting with the remainder of lower plumage.*	Do. *The yellow merging into the breast.*	Chin, throat, and breast, yellow. Chin with black shaft-stripes.	Chin, throat, and breast yellow. Chin with black shaft-stripes.	Chin bright yellow, with a few black shaft-stripes.	*Chin white with black shaft streaks, the white contrasting* with the remainder of lower plumage.	*Chin whitish with black shaft streaks.* *White not contrasting* with but merging into remainder of lower plumage.
Lower plumage ..	A dirty yellowish-buff. Olivaceous on the flanks.	Dull greyish-olive ..	Greyish, tinged with olive on the flanks.	Greyish-olive ..	Breast yellowish, flanks and abdomen dark olive.	Tawny buff	Fulvous, olivaceous on the flanks.
Probable distribution.	Nepal and Sikhim .. *Note.*—Two very poor specimens in the British Museum from Manipur are possibly this sub-species. I have seen no typical *ruficeps* from Assam.	Bhamo and Shan Hills on the east of Burma.	Kwang-tung, Fohkien, Foochoo, Hunan, Szechuen, China.	Island of Formosa.	Island of Hainan .	The Shan States, Pegu and Tenasserim, Burma.	Assam, Bhutan, and Sikhim. (*Note.*—Birds from Margherita, Assam, appear to be smaller than the Khasia Hills birds).

Stachyrhidopsis pyrrhops, Hodgson.

The Red-billed Babbler.

Stachyrhis pyrrhops, Hodgson, Blyth, J., A. S. B., p. xiii., p. 379 (1844).

Stachyrhidopsis pyrrhops, Sharpe, Cat., B. M., vii., p. 600; Oates, F.B.I. i., p. 165.

Description.—As in Oates, F. B. I.

Distribution.—The Himalayas, Murree to Nepal.

Stachyrhidopsis ruficeps and rufifrons.

S. ruficeps and its allied races extend from Nepal eastwards along the foot hills of the Himalayas to Assam and Burma, and from thence into China and the Islands of Formosa and Hainan.

The first of these to be described was *S. ruficeps*, Blyth, 1847, from Darjeeling. In the original description Blyth first compares it with *S. pyrrops*, a bird with a black chin, he then gives description as follows: "*chin and middle of throat white*, with slight black central streaks to the feathers; the rest of the upper parts *plain olive, and of the lower whitish, with a fulvous tinge on the side of the neck and breast.* Blyth, J., A. S. B., 1847, p. 452.

The above is almost an exact description of what at present is considered *S. rufifrons*, Hume, originally described from Pegu, Burma, but stated to occur in Sikhim and Assam.

Birds of the above description also occur in the Sikhim Hills, Butan Duars, and Assam, and are evidently birds of low elevation.

The true *S. ruficeps* from Sikhim and Nepal is a very different bird, having *the chin and throat yellow with black shaft stripes, breast and under parts a decided yellow* and *upper plumage green*, the rufous of the head extending well over the nape.

Jerdon, 1863, also mentions the white chin and throat, but states "underparts fulvous, or dull oil yellow or pale ferruginous," and I think must have been confusing the two species, as *S. rufifrons*, Hume, was not described until 1893, and much later than this was stated to occur in Sikhim.

Since writing the above, on my way through Bombay, I have been able to examine both of Blyth's types of *S. ruficeps*, from Darjeeling. These were kindly forwarded for my inspection by Dr. Annandale from the Calcutta Museum. Both these specimens are very faded, but fortunately the rufous cap on the head is quite conspicuous, and extends well over the nape, so that there can be no doubt that they are what are now considered to be *S. ruficeps*, and not *S. rufifrons* which I considered possible from both Blyth's and Jerdon's description.

However *S. rufifrons*, Hume, from Pegu, differs materially from the so-called specimens from Darjeeling and Assam, for the latter I propose the name *S. rufifrons ambigua*, sub-sp. nov.

As both *S. ruficeps*, and *S. rufifrons* and their geographical races (or sub-species) occur in the same localities, they must be distinct species, (and not the one a sub-species of the other). The former being found at higher elevations than the latter, which appears to be a bird of the plains and low foot hills.

More and fresh specimens of these confusing little birds are required to enable us to form a complete idea of their distribution.

* STACHYRHIDOPSIS RUFICEPS RUFICEPS, Blyth.

The Nepal Red-headed Babbler.

Stachyrhidopsis ruficeps, Blyth, J. A. S. B., 1847, p. 452; Sharpe, Cat., B. M., vii., p. 598; Oates, F. B. I., i., p. 164.

"Allied in form and size to *S. pyrrhops*, Hodgson, J. A. S. B., xiii., p. 379, but having the crown light ferruginous, and *the chin and middle of the throat white*, with slight black central streaks to the feathers; rest of the upper parts plain olive, *and of the lower whitish, with a fulvous tinge on the sides of the neck and breast.*

Length of wing two inches and an eighth, and of tail an inch."

"From Darjeeling." (Blyth).

"*Description.*—Crown of the head light ferruginous, the rest of the upper plumage plain olive; *chin and middle of the throat white*, with faint black streaks; *the rest of the lower parts whitish, with a fulvous tinge on the sides of the neck and breast*, or, throughout of dull oil-yellow or pale ferruginous, darkest on the breast, and fading, and becoming dusky towards vent."

"Nepal, Sikhim and Khasia Hills." *Jerdon, Birds of India, ii., p. 22* (1863).

The above two descriptions are very misleading, so I give the following, taken from the large series in the British Museum:

Lores, bright yellow, crown and nape bright rufous chestnut, the feathers slightly lengthened, and so forming a conspicuous reddish cap to the head; the feathers of the forehead with very indistinct black shaft streaks. Upper plumage olive-brown with a decided rufous tinge. Chin yellowish with decided black shaft streaks. Lower plumage a dirty yellowish-buff, and olivaceous on the flanks.

Bill, horn-coloured; wing, 54—58 mm.

STACHYRHIDOPSIS RUFICEPS BHAMŒNSIS, Harington.

The Bhamo Red-headed Babbler.

Stachyrhidopsis bhamœnsis, Harington, Ann. and Mag. of N. H. Ser., 8, vol. ii., p. 245 (1908); J. B. N. H. S., xix., p. 117.

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* *Stachyrhidopsis ruficeps davidi*, Oustalet.

S. davidi, Oustalet, Bull. Mus. Paris., 1899, p 119.

S. sinensis, O.-Grant, Ibis, 1907, p. 184

"Nearest to *S. præcognitus*, Swinhoe and *S. ruficeps*, Blyth, but the back greyish-olive, and breast and abdomen ashy, not yellow." (Oustalet).

Habitat.—Szechuen.

"Crown light chestnut, which does not extend over the nape, and without black shafts to the feathers; upper parts cold greyish-olive; throat yellowish; middle of breast and belly pale whitish-olive, and flanks greyish-olive." (O.-Grant.)

Habitat.—China.

Note—I cannot find any difference between the numerous specimens from China, therefore *S. sinensis*, O.-Grant, will be a synonym of *S. davidi*, Oustalet.

Stachyrhidopsis ruficeps præcognitus, Swinhoe.

Swinhoe, Ibis, 1866, p. 310.

Habitat.—Formosa.

Stachyrhidopsis ruficeps goodsoni, Rothschild.

Rothschild, Nov. Zool., xvii., p. 232.

Habitat.—Hainan.

Description—"Adult male. Resembles *S. sinensis*, Grant; (*S. r. davidi*, Oustalet) in having the light chestnut on the head confined to the crown and not extending over the nape, but may be easily recognised by its much larger and more massive bill. It differs in having faint black shaft-streaks to the feathers of the forehead, the throat less yellow, much the same colour as the breast, which is a dull greyish-olive, and the sides of the head and neck grey instead of yellowish." (Harington).

"Total length, about 4·6 inches; exposed part of the culmen, 0·5; wing, 2·1; tail, 2·2; tarsus, 0·8."

"Adult female. Similar to the male. Wing, 52-55. mm.

Distribution.—The Bhamo hill tracts, and Southern Shan States. The nesting has been described by me in the Journal. The eggs are a pure white with a few pale red spots and average ·65 × ·52 inches.

Stachyrhidopsis rufifrons rufifrons, Hume.

Humes' Babbler.

Stachyrhidopsis rufifrons, Hume, Str. Frs., iii., p. 479 (1873); Sharpe, Cat., B. M., vii., p. 599; Oates, F. B. I., i., p. 165.

"Closely allied to *S. ruficeps*, but smaller, wing 1·9″, bill at front ·05″, tarsus 0·67″. The rufous of the head duller, and not extending to the occiput. Upper surface wanting the strong greenish-olive tinge, and the lower surface wanting the oil yellow tinge of *ruficeps*." (Hume.)

Note.—The type is in the British Museum, it is an immature and badly damaged specimen, fortunately Mr. J. P. Cook collected three birds in the Pegu Yomas, the locality from which the type was procured, these are now in the Tring Museum, and from which I have taken the following description.

Lores, white with black tips to the feathers; crown, dull rufous, which is confined to the crown; the feathers have faint indications of black shaft-stripes; chin and throat, *white* with black shaft-stripes; *whitish* on the breast; flanks and abdomen, a rich tawny buff; upper plumage greyish olive.

Wing: 49, 50, 50 mms.

Stachyrhidopsis rufifrons ambigua, sub-sp. nov.

Similar to *S. r. rufifrons*, Hume, from Pegu, differs in having the lores yellow instead of white; in having the feathers of the forehead conspicuously black shafted; chin, whitish and not contrasting with the remainder of the lower plumage; breast and under parts, pale fulvous and not a rich tawny buff.

Bill, light fleshy; irides, light brown; legs, fleshy. Wing: males, 53-54 mm., females, 51-52 mm.

Type in the Tring Museum. Coll. E. C. S. Baker, Gunjong, N. Cachar, 26th Dec. 1895.

Distribution.—Probably Sikhim, Butan Duars, Assam, Naga Hills and Manipur. Birds from Margherita, N. Assam, appear to be slightly smaller than N. Cachar specimens.

Stachyrhidopsis poliogaster, Hume, 1880.

Stachyrhis poliogaster, Hume, S. F., ix., p. 116 (1880).
Stachyrhidopsis poliogaster, Sharp Cat., B.M., vii., p. 599.
Stachyrhis poliogaster, Oates, F. B. I, i., p. 161.

Habitat.—"Gunong Pulai, near southern-west extremity of the Malay Peninsula." There is only one specimen known, the type, which is labelled "*Cyanoderma poliogaster*." To me this appears to be a young bird of the *S. rufifrons*. Hume type, and may possibly be that species, of which there are very few good specimens.

Mixornis, Hodgson (1842).*

Oates, F. B. I., i., p. 166.

"The genus *Mixornis* differs from all the other genera of slender-bille *Timeliinæ* in having the nostrils oval, exposed and not covered by a scal or membrane as in the others." (Oates).

They have besides the following characteristics, a short rounded wing the first four primaries graduated; wing and tail about equal in length the feathers of the forehead soft; bill slender and slightly curved; rictal bristles weak; and no overhanging hairs over the nostrils.

There is an extraordinary resemblance in the coloration of *Mixornis* and *Stachyrhidopsis ruficeps*, both having rufous caps; yellowish under parts and striped throats, and have consequently been often confused. The distinguishing feature between these two genera being their bills, in *Mixorni* this is slender and slightly curved, and the nostrils exposed, while in *Stachyrhidopsis*, the bill is conical, the upper and lower edges of the mandibles straight, and almost the same description as in the Goldfinch, and the nostrils covered by a membrane.

Mixornis extend from the foot-hills of Nepal to Assam and Burma, and from there into Malayana and the Islands; within Indian limits we have two geographical races which gradually pass from one into the other.

Mixornis gularis rubricapillus, Tickell.

Motacilla rubricapilla, Tickell, J. A. S. B., ii., p. 576 (1833).

Mixornis rubricapillus, Sharpe, Cat., B. M., vii., p. 578; Oates, F. B. I., i. p. 167.

Stachyrhidopsis sulphurea, Rippon, Bull., B. O. C., xi., p. 11.

Mixornis gularis rubricapillus, Harington, Bull., B. O. C., xxxiii.

"Female 5 inches, eyes reddish hazel; bill and legs pale horn; crown of head rusty; feathers of the nostrils, over the eye, auriculars and sides of the neck, pale yellowish green; upper parts olive; throat and breast pale yellow shafted black." (Tickell).

Description.—"Extreme point of forehead and the lores yellow with black shafts, continued back as a uniform yellow supercilium; crown pale ferruginous, blending on the nape with the olive-green of the upper plumage and sides of the neck; ear-coverts dull yellow with pale shafts; centre of breast and abdomen plain yellow; remainder of lower plumage dull ashy yellow." The upper plumage wings and tail have a decided rufous tinge.

Birds from Sikhim, Bengal and the Butan Duars have very little rufous on the head, which is almost uniformly the same as the back, with only a slight rufous wash on the forepart of the head; under parts very dull.

Birds from Assam are a little more rufous on the head, but under parts dull yellow. "Iris reddish hazel; bill horny; legs pale horny."

Birds from Burma have the forehead and crown bright rufous; and under parts bright yellow. "Iris a sickly white."

Wing 57-61 mm.; tail 54 mm.; culmen 13-14 mm.; tarsus 20 mm.

Distribution.—Chota Nagpore, Sikhim to Assam, throughout Burma and the Shan States to Tenasserim, it does not ascent the hills to any great height (Lately recorded from Bengal in Journal).

Habits and Nesting.—In Burma, I have found it very partial to bamboo jungle, and essentially a plains bird, not ascending the hills to any great

*Outside Indian limits, there are numerous races of this genus, which extends as far as the Philippine Islands.

M. flavicollis, Bp., Java; *M. frigida*, (Hartl.), W. Sumatra: *M. prillwitzi* Hartert, Kangean Islands: *M. everettei*. Hartert. Natuna Islands. *M. woodi* Sharpe, Philippine Islands; *M. javanica*, Cab., Java; *M. montana*, Sharpe N. W. Borneo; *M. erythronota*, Reichenow, Java.

height. Although nesting near the ground, it seems to have lost its Timeliine habits, and appears to feed entirely in trees. It has a very monotonous call of "Chuk, Chuk, Chuk," which it seems to utter throughout the day. The breeding season commences in March, the nest, an untidy dome shaped affair of bamboo leaves and grass, is either placed in the bamboo clump, or small bush near the ground. 2, 3, and 4 eggs are incubated, these are white spotted with rusty red chiefly at the larger end.

Note.—Stachyridopsis sulphurea, Rippon, Bull., B. O. C., xi., p. 11 (1900). "The specimen so named by Col. Rippon is not a *Stachyridopsis*, but an example of *Mixornis gularis rubricapillus*, Tickell. The name therefore becomes a synonym of that species." (Harington.)

MIXORNIS GULARIS' GULARIS, Raffles.

Motacilla gularis, Raffles, Trans. Linn. Soc., xiii., p. 312 (1820).

Mixornis gularis, Sharpe, Cat., B. M., vii., p. 576; Oates, F. B. I., i., p. 168.

Description.—Similar to *M. rubricapillus*, differs in having a more brownish tinge on the back; chin, throat and breast boldly striped with black; crown dark chestnut; wings also a dark chestnut.

Iris, pale red-brown; lower mandible and orbital skin, pale blue; rest of bill bluish-brown; legs and feet greenish-brown.

Wing 58-62 mm.; bill 14-16 mm.; tail 57 mm.; tarsus 20 mm.

Distribution.—S.Tenasserim to the Malay Peninsula and Sumatra.

CYANODERMA, Salvadori (1874).

Very similar in characteristics to *Stachyrhis*, differs from that genera in having the skin round the eye naked, and of a bright colour, only one species just comes within Indian limits.

Distribution.—C. erythropterum, Blyth, S. Tenasserim to Sumatra and Borneo; *C. fulvirenter*, Richmond, Banjak Island, N. W. Sumatra; *C. bicolor*, Blyth, Borneo, Labuan.

CYANODERMA ERYTHROPTERUM, Blyth.

The Red-winged Babbler.

Timalia erythropterum, Blyth, J. A. S. B., xi., p. 794 (1842).

Mixornis erythropterum, Sharpe, Cat., B. M., vii., p. 580.

Cyanoderma erythropterum, Oates, F. B. I., i., p. 166.

Description.—As in Oates, F. B. I.

Distribution.—As above. I can find nothing recorded as to the nesting habits of this genus.

TURDINULUS Group.

In this, I have placed *Corythocincla*, *Turdinulus* and *Rimator*, all of which are remarkable for their extremely short tails.

They all have the following characteristics: a short rounded wing, and an extremely short tail; and upper plumage more or less squamated.

KEY.

A. Bill long and curved .. .. *Rimator.*
B. Bill moderate and straight .. *Turdinulus.*

TURDINULUS, Hume (1878).

Turdinulus, Hume, (1878); Oates, F. B. I., i., p. 176.

Corythocichla, Sharpe, (1883); Oates, F. B. I., i., p. 148; O.-Grant, Ibis, 1897, p. 58; Hartert, Nov., Zool., ix., p. 564; Buttikofer, Notes, Leyden Museum, xvii., p. 74.

"Small; bill slender, compressed on the anterior half, nostrils covered by a membrane, nasal aperture split-shaped, and placed along the

bottom near the front of the membrane; tarsi and toes long, the first more than half the tail, which is very short, giving, together with the rounded wing, the bird a very ball-like appearance, much reminding of *Troglodytes*; rictal bristles short; plumage mottled above and below, the feathers of the back with white or pale fulvous shaft-streaks; rump-plumes unstriped, very long and fluffy; superciliary streak and triangular spots on the tips of the wing-coverts and inner secondaries white or pale fulvous." (Buttikofer).

Both Mr. Ogilvie-Grant and Dr. Hartert agree in uniting *Turdinulus* and *Corythocichla* in the same genus; they have the same characteristics, except in the former the tail is extremely short, the exposed portion of the tail extending barely half an inch beyond the tail coverts, while in the latter they extend about an inch.

Their wings are short and rounded, fitting close to the body, the first four primaries graduated; tail much shorter than the wing; upper plumage squamated; bill straight; rictal bristles weak; no hairs overhanging the nostrils; nostrils slits, with no actual overhanging membrane.

Amended Key to the Species of Turdinulus.

(*Cf. Ogilvie-Grant, Ibis* 1896), p. 58.,
Harington, Bull. (B. O. C., xxiii., p. 45.)

I. Tail extending more than 1 inch beyond the upper tail-coverts. (*Corythocichla.*)
  A. Feathers of the middle of the throat white or grey, each with a median greyish-black streak.
    a. Tips of the wing-feathers white.
      a'. Sides of the breast and flanks chestnut.
        a''. Wings 65 mm. and under ..... *T. brevicaudatus brevicaudatus.*
        b''. Wing over 65 mm. ..... *T. b. venningi.*
      b'. Sides of the breast and flanks reddish-olive-brown ..... *T. b. leucostictus.*
    b. Tips of the wing-feathers buff; sides of the breast and flanks reddish-brown ..... *T. b. striatus.*

II. Tail extending less than half an inch beyond the upper tail-coverts. (*Turdinulus.*)
  B. Feathers of the middle of the throat white or whitish-buff, with a triangular black spot at the end of each. Tips of wing-feathers white.
    c. General colour of plumage brown, washed with rufous, especially on the sides of the breast and flanks ..... *T. roberti roberti.*
    d. General colour of plumage dark brown; sides of the breast and flanks dark olive-brown ..... *T. r. guttaticollis.*
  C. Feathers of the middle of the throat uniform, devoid of black streaks or spots.
    e. Middle of throat white.
      c'. Sides of the neck spotted with black and white; breast reddish-brown boldly striped with white ..... *T. epilepidotus epilepidotus.*
      d'. Sides of the neck spotted with black and buff; breast buff, margined with reddish-brownish, producing a squamate appearance ..... *T. e. exsul.*

e'. Sides of the neck spotted with brown and buff; breast with brownish-buff edges .. *T. e. granti.*

f. Middle of throat buff.

f'. General colour of plumage brown, washed with rufous, especially on the sides of the breast and flanks ..... *T. e. davisoni.*

g'. General colour of plumage dark brown, sides of the breast and flanks dark olive-brown ..... *T. e. bakeri.*

Geographical Distribution.

(*Corythocichla*).—(1) *T. b. brevicaudatus* (Blyth), Tenasserim; (2) *T. b. venningi*, Harington, Shan States and Yunnan; (3) *T. b. leucostictus* (Sharpe), Perak, Malay Peninsula; (4) *T. b. striatus* Walden, Assam and Munipur, (*Turdinulus*).—(5) *T. r. roberti* G. Austen, Khasia, Garo Hills, N. Cachar, Lushai Hills, Manipur, and Naga Hills; (6) *T. r. guttaticollis* O.-Grant, Mishmi and Miri Hills, Dibrugarh, Assam; (7) *T. epilepidotus epilepidotus*, Temm, Java and Sumatra; (8) *T. e. exsul* Sharpe, Borneo; (9) *T. e. granti*, Richmond, Siam and Malay Peninsula; (10) *T. e. davisoni* O.-Grant, Tenasserim; (11) *T. e. bakeri* Harington, Shan States, Burma.

TURDINULUS BREVICAUDATUS BREVICAUDATUS, Blyth.

Blyth's Wren-Babbler.

Turdinus brevicaudatus, Blyth, J. A. S. B., xxiv., p. 272 (1855).

Corythocichla brevicaudata, Sharpe, Cat., B. M., vii., p. 592; Oates, F. of B. I., i., p. 148.

Description.—"Whole upper plumage and sides of the neck olive-brown; the feathers everywhere margined with black except on the rump and upper-tail coverts; tail rufescent; wings olive brown; the coverts and all the quills, except the earlier primaries, tipped with a small white spot; lores, a short supercilium, cheeks and under the eye deep ashy; ear coverts the same; but tinged with rufescent; chin and throat ashy white, streaked with dark brown; breast and lower plumage ferruginous, paler on the centre of the abdomen, darker on the flanks, vent, and under-tail coverts, which latter are tipped paler." (Oates.)

"Legs, feet, and claws, pale-brown to palo fleshy brown; upper mandible very dark brown, lower plumbeous to pale plumbeous; iris, deep brown, red-brown, cinnamon-red." (Oates.)

"Length about 5·5″; tail 1·7″; wing 2·4″; tarsus 1″; bill from gape 8″."

Distribution.—Muleyit Mt. and the hills of Tenasserim. Nothing much seems to be known about its habits, except that it inhabits the rocky portions of the hills, and seldom flies if it can help. Nothing appears to be known about its nidification, which is probably similar to that of *T. b. striata*.

TURDINULUS BREVICAUDATUS VENNINGI, * Harington.

Venning's Wren-Babbler.

Harington.—Bull., B. O. C., xxxiii., p. 44 (1913).

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* TURDINULUS BREVICAUDATUS LEUCOSTICTUS, Sharpe.

Sharpe, P. Z. S., 887, p. 438.

Similar to *T. b. brevicaudatus*, differs in having no tinge of rufous below, but ashy-grey, also the same above, feathers tinged with grey with darker edges, wing spots white.

Wing 63 mm.

Habitat.—Perak, Malay Peninsula.

"Frequents the undergrowth usually in pairs, and has an unusually loud song for such a small bird." (Sharpe.)

Description Adult.—Similar to *Turdinulus brevicaudatus*, Blyth, from Tenasserim; but differs in being much larger and in having the upper plumage greyer, the breast dark rufous, the abdomen the same colour as the breast, and the flanks dark brown.

In *T. brevicaudatus* the breast is pale rufous, the abdomen creamy-buff and the flanks tinged with olive.

Wing measurements:—

T. b. brevicaudatus. 10 examples. Wing 60-65 mm. Average 63 mm.

T. b. venningi. 15 examples. Wing 65-74 mm. Average 68 mm.

"Irides red, bill dark brownish-horn, paler beneath, the legs and feet fleshy-brown." (Venning.)

Habitat.—The Southern Shan States, Burma, and Yunnan.

There is one specimen collected by Colonel Rippon in the Salween Valley (presumably in Yunnan), 2,800 to 3,000 feet.

"I have the eggs of a *Turdinulus* from the Southern Shan States which are presumably of this sub-species. They are exactly like those of *T. b. striatus* hereafter described and measured 84″×62″." E. C. S. B.

Turdinulus brevicaudatus striatus, Walden.

Walden's Wren-Babbler.

Turdinus striatus, Walden, A. M. N. H. (4), vii., p. 241 (1871).

Corythocichla striata, Sharpe, Cat., B. M., vii., p. 593; Oates, F. of B. I., i., p. 148; Stuart Baker, J. B. N. H. S., viii., p. 179.

Description.—Similar to *T. brevicaudatus*, "Differs in having the sides of the head brown instead of deep ashy, and in having the breast and lower plumage brown slightly tinged with rufous, instead of ferruginous; the spots at the tips of the wing-coverts and quills are less distinct, and are fulvous, and not white."

Length about 5″; tail 1.8″; wing 2.3″; tarsus 95″; bill from gape 8″. (Oates.)

Distribution.—The Khasia, Cachar and Garo Hills, Manipur and Dibrugarh in Assam, both N. and S. of the Brahmapootra.

Habits.—Stuart Baker gives a very good description of the habits and nidification of this bird in the Journal. Shortly these are, it rarely makes use of its wings, but moves about quickly on its feet, it builds an almost domed nest of leaves and moss, lined with the same, which is invariably placed on the ground. The eggs, of which four appears to be the full complement, are white, freckled with pinkish red spots, with underlying pinkish purple markings; and measure from ·78″ to ·83″ by ·59″ to ·62′.

Turdinulus roberti roberti, Godwin-Austen.

Austen's Wren-Babbler.

Pnoepyga roberti, Godwin-Austen and Walden, Ibis (1875), p. 252.

Turdinulus roberti, O. Grant, Ibis (1896), p. 55; Blanford, F. B. I. iv., App. P., p. 480.

Corythocichla squmata, S. Baker, J. B. N. H. S., xiii., p. 403.

Description.—Upper plumage brown with a rufous tinge, each feather pale centred with darker edges, giving a mottled appearance; supercilium buffish-white; feathers of the middle of the throat white, with a triangular black spot at the end of each feather; sides of the throat ferrugineous; breast olive-brown with broad white shaft stripes, giving a very striped appearance; flanks olive-brown tinged with rufous; vent and under-tail coverts bright rufous; wing coverts and wing feathers tipped with white.

Wing measurement, 55 mm.

Distribution.—The Cachar, Manipur and Naga Hills.

Habits.—"Robert's Babbler is to be found in some numbers, though nowhere, I imagine, commonly, in the higher ranges bordering on the plains of Assam. The nest and eggs are exact counterparts of those of *Corythocichla striata* in everything but size. Three seems to be the ordinary number of eggs laid, though sometimes as many as four are found, and about equally often only two are found." "My eggs average ·71″ by ·56″ and vary in length between ·80″ and ·67″ and in breadth between ·53″ and ·58″. (Baker, Ibis (1906), p. 106)."

TURDINULUS ROBERTI GUTTATICOLLIS,* O. Grant.

Grant's Wren-Babbler.

T. guttaticollis, O.-Grant, Ibis. (1895), p. 432, *ibid* (1896), p. 57.

Description.—Very similar to *T. r. roberti.* differs in being darker and browner above; and lacks the rufous on the sides of the breast and flanks; also there is very little rufous on the cheeks.

Wing measurement; 55 mm.

Distribution.—The Hill Ranges N. and S. of the Brahmapootra in eastern Assam. There are two specimens in the Museum collected by Dr. Coltart from Margherita, Assam, which are undoubtedly this sub-species.

Habits.—"The habits and nidification are exactly like those of *T. roberti.* The bird is a skulker, creeping about the undergrowth and bushes much like a wren and never taking to wing unless forced. It is found singly or in pairs and never in flocks like other Timeliinæ, in fact in every way it is very wren like habits, nidification, flight and general appearance. E. C. S. B."

* TURDINULUS EPILEPIDOTUS DAVISONI, O. Grant.

Davison's Wren-Babbler.

O. Grant, Bull., B. O. C., XXV., p. 97.

"Easily distinguished from *T. e. exsul* (Sharpe), to which it is most nearly allied, by having the cheeks and side of the throat washed with rust colour, (note, as in *roberti*), and under parts more olive-brown, much less suffused with rufous, and distinctly streaked with whitish."

Measurements as in *exsul.*

Distribution.—Tenasserim.

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* TURDINULUS EPILEPIDOTUS EPILEPIDOTUS, Temm.

Description.—Similar to *T. r. roberti,* throat unspotted white, cheeks white spotted with black breast olive-brown, with white shaft-stripes giving a very streaked appearance

Distribution.—Java and Sumatra.

TURDINULUS EPILEPIDOTUS HAINANUS, Hartert.

Hartert, Nov. Zool., xvii, p. 230 (1910).

Like *Turdinulus, r. roberti.*

Habitat—The Island of Hainan.

TURDINULUS EPILEPIDOTUS EXSUL, Sharpe (1888).

exsul, Sharpe, Ibis (1888), p. 479.

Habitat.—Borneo.

TURDINULUS EPILEPIDOTUS GRANTI, Richmond (1900).

Turdinulus granti, Richmond, Proc. U. S. Nat. Mus., p. 320 (1900); *Thumii* (Hartert), Nov. Zool., ix., p. 564; Grant, Bull., B. O. C., XXV., p. 97.

Similar to *T. e. exsul* (Sharp), Borneo. Throat unspotted white, under parts very much paler, the feathers of the centre of the breast having white centres giving a very pale appearance below. Wing, ·55 mm.

Distribution.—Siam and Malay Peninsula.

Turdinulus epilepidotus bakeri, Harington.

Baker's Wren-Babbler.

Harington, Bull., B. O. C., xxxiii., p. (1913).

Adult. Similar to *T. e. davisoni* (O. Grant) from Tenasserim ; but differs in having the under parts not suffused with rufous, and in having the upper plumage much darker. The differences are very similar to those between *T. roberti* ; (Godwin-Austen), from the Naga and Manipur Hills and Cachar, and *Turdinulus roberti guttaticollis*, O. Grant, from the Miri and Mismi Hills, and the Dibrugarh District of Assam.

Measurements, the same as *T. e. davisoni.*

Habitat.—The Southern Shan States and Karennee, Burma.

Type.—In the British Museum.

Rimator, Blyth (1847).

Oates, F. B. I., i., p. 175.

" In this genus the bill is slender and as long as the head ; the culmen is curved downwards and the tip of the bill is barely notched ; the rictal bristles are short; the nostrils are open ovals. The tail is less than half the length of the wing and slightly rounded." (Oates.)

Rimator malacoptilus, Blyth.

The Long-billed Wren-Babbler.

Blyth, J., A. S. B., xvi., p. 155 (1847) ; Sharpe, Cat., B. M., vii., p. 594 ; Oates, F. B. I., i., p. 175 ; Baker, Ibis, 1909 p. 104.

Description.—As in Oates, F. B. I.

Distribution.—Sikhim, Manipur and Cachar Hills.

Nidification.—It appears to build an untidy domed nest on the ground, laying four eggs. The ground colour a faint pinkish-white, the markings rather profuse at the large end, consisting of specks and blotches of reddish brown, measuring from ·84″-·81″ × ·60″-·62″.

Setaria Group.

These are birds I know personally nothing about, only having examined and gone through the specimens in the British Museum. *Setaria* and *Æthostoma* appear to me to be non-Timeliine in every way ; on the other hand *Erythrocinchla* seems to have a relationship to *Malacocinhla* (*Tardinus*). I can find nothing recorded about the nidification of these genera, there are, however, two eggs of *Malacopterum* (*Ophrydornis*) *albigularis*, in the Museum, these are a pale spotless blue and thoroughly non-Timeliine.

These three genera have the following characteristics : stout straight bills ; extremely long rictal bristles ; long pointed wings ; a short tail and weak legs and feet.

Setaria, Blyth (1844).

Sharpe, Bull., B. O. C., xii., p. 54. Sharpe, Hand List of Birds, iv., p. 38. *Malacopterum*, Oates, F. B. I., i., p. 150.

Dr. Sharpe gives the above generic name for *Malacopterum*, Eyton, which is already occupied.

" This genus is remarkable for its lengthened wings and, in consequence, its comparatively short tail. The plumage is soft and silky. The two Indian species of this genus appear to be more arboreal in their habits than any of the preceding genera, and to have somewhat of the deportments of Bulbuls. The rictal bristles are very conspicuous on account of their length." (Oates.)

Büttikofer.—Notes—Leyden Museum, xvii., p. 101.

"Bill long and rather stout, not fully as long as the head, as high at the nostrils as it is broad; nasal aperture oval and placed in front of the nasal groove; rictal bristles long, reaching beyond the nostrils; tail considerably shorter *than the pointed wing*, but three times as long as the tarsus, *which is remarkably short*, not more than an inch in length; toes rather short and weak in proportion to the tarsus."

The chief characteristics of this genus are given by Dr. Büttikofer, namely: a pointed wing, and remarkably short tarsus and weak feet. These characters are total foreign to the *Timeliinæ*, whose characteristics are a short rounded wing, and large and strong legs and feet. Besides the above, *Setaria* have powerful straight bills, with a few overhanging hairs over the nostrils and long well developed rictal bristles.

Setaria magna magna,* Eyton

The Red-headed Tree-Babbler.

Malacopterum magnum, Eyton, P. Z. S. (1839), p. 103; Sharpe, Cat., B. M., vii., p. 565; Oates, F. B. I., i., p. 151.

Description.—"Forehead and crown bright ferruginous, the anterior feathers black-shafted and the posterior ones faintly edged with black; lores and a broad supercilium grey; the middle of the feathers whitish; the whole nape black; ear-coverts fulvous-brown with pale shafts; the whole upper plumage olive-brown, tinged with ferruginous on the rump, which colour also suffuses the upper tail-coverts and the outer webs of the tail feathers; cheeks mottled grey and white; chin, throat, and upper breast white, streaked with grey; remainder of lower plumage greyish-white."

"Legs, feet, and claws, blue, varying from pale plumbeous to pale small blue; upper mandible dark horny brown, lower mandible and often the edges of the upper plumbeous blue, fading to bluish white at the tips; iris carmine to orange red."

Length about 7″, tail 3″, wing 3·5″, tarsus 9″, bill from gape 1″.

Distribution.—The extreme south of Tenasserim, extending down the Malay Peninsula to Sumatra and Borneo.

Habits and Nesting.—I can find nothing recorded about its nidification. "This bird hunts about trees and bushes in pairs and small parties, seldom or never descending to the ground." (Oates.)

Setaria magnirostris, † Moore.

The Brown-headed Tree-Babbler.

Setaria magnirostre, Oates, F. B. I., vol. i., p. 151.

Turdinus magnirostris.—Sharpe, Cat., B. M., vol. vii., 547.

Description.—As in Oates, F. B. I.

Distribution.—The extreme south of Tenasserim, the Malay Peninsula, and Cochin China.

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* Setaria magna cinerea, Eyton.

Malacopterum cinereum, Sharpe, Cat. B.M., p. 565.

Bill black, the mandible whitish lead colour; legs and feet pale pinkish lead-grey; iris, Indian red. Length 6″, culmen 65, wing 3, tail 25, tarsus 8. Female slightly smaller.

Distribution.—Malay Peninsula, Borneo, Sumatra.

†Setaria affinis, Blyth.

Malacopterum affine, Sharpe, Cat., B. M., vii., p. 569.

Lores and a short streak to the eye whitish; forehead, crown and nape dark brownish to black, upper plumage dark fulvous brown, tinged ashy on upper

AETHOSTOMA, Sharpe (1902).

Sharpe, Bull., B. O. C., xii., p. 54 (1902).
Trichostoma, Blyth.
Oates, F. B. I., i., p. 153.

Dr. Sharpe proposes the above name for this genus, *Trichostoma*, being already occupied.

This genus is very nearly allied to *Setaria*, and is not a true *Timeliidæ*, having a fairly long wing, which does not fit close to the body, and is not probably strictly arboreal, and for these reasons should be removed from this group. It has the following characteristics: Wing long, the first four primaries graduated; tail shorter than the wing; tarsus not particularly long; bill short and straight; rictal bristles very long.

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back and rufous on rump; upper tail-coverts chestnut; feathers of lower back dense and long, concealing a few whitish feathers just above the tail coverts; exposed portions of wing like back, tail dark-brown, outer edges tinged chestnut; chin and throat white faintly streaked with grey, sides of the neck and ear coverts ashy, breast whitish washed with brownish-grey, abdomen and under-tail coverts whitish; flanks brownish-grey. "Legs dark or bluish lead-colour: iris bright brown or dark raw sienna: bill bluish lead-colour, the culmen darker." (Sharpe.)

Length 6·2″, culmen ·65″, wing 2·8″, tail 2·8″, tarsus ·85″. (Sharpe).

Distribution.—Malay Peninsula, Sumatra, Borneo.

†OPHRYDORNIS ALBIGULARIS, Blyth.

Malacopterum albigularis, Sharpe, Cat. B. M., vii., p. 568.
Setaria albigularis, Oates, Cat., Birds Eggs, iv., p. 38.
Ophrydornis albigularis, Büttikofer Notes, Leyden Museum, xvii., p. 101.

Lores and a conspicuous streak over the eyes white, forehead, crown and nape dark sooty brown to dull black; upper plumage dark umber brown, tinged with ashy on the upper back and rufous on rump and upper-tail coverts; exposed portions of tail and wing, same as middle of the back, a dark umber brown; ear-coverts like the crown; chin and throat white, a pale ashy-grey collar from the sides of the neck across the breast, abdomen whitish tinged with greyish-buff on the flanks; and under-tail coverts pale fulvous.

"Bill black; legs leaden grey; iris bright red or crimson. Length 5·6″, culmen ·6,″ wing 2·95″, tail 2·2,″ tarsus. 8″"

Distribution.—Malay Peninsula, Borneo.

The two eggs of the Malayan White Throated Babbler, in the collection are of a blunt oval form, glossy, and of a spotless pale greenish-blue. They measure, respectively, ·75″ × ·53″ and ·75″ × 52″, Klang, Malay Peninsula, W. Davison (Hume, Coll.). I cannot find any account of the nesting of this species, the eggs are however, of a quite un-Timeliine character.

†OPHRYDORNIS MELANOCEPHALA, Davison.

Malacopterum melanocephalum, Davison, Ibis (1892), p. 101.

Similar to *O. albigularis*.

"Lores dirty white; forehead, top of head and nape, dull black, cheeks and ear-coverts grey, ear coverts pale shafted; Back, rump and upper tail-coverts olive-brown, suffused most strongly so on upper tail coverts with rusty: tail feathers brown like the upper back, margined with a rusty tinge on the outer webs, none of the tail feathers with any trace of white or pale tipping. Lower surface white, the feathers of the breast suffused with grey, forming a feather band, with grey continuing down the flanks."

Only one female secured.

Length 6·45, wing 3·0, tail 3·1, tarsus 9, bill from nape 8.

Habitat.—Mouth of Timeling river. Pahang, E. Malay Peninsula.

Note.—Have not been able to examine this species.

Aethostoma rostratum, Blyth.

Blyth's Babbler.

Trichostoma rostratum, Blyth, T. A. S. B., xi., p. 795 (1842); Sharpe, Cat., B. M., vii., p. 562; Oates, F. B. I., i., p. 153.

Description.—As in Oates, F. B. I.

Nothing appears to be known about the habits of this bird.

Distribution.—Extreme south of Tenasserim, extending to Sumatra and Borneo.

Erythrocichla, Sharpe (1883).

Buttikofer. Notes Leyden Museum, xvii., p. 98.

Bill long and strong, rather broad at the base, nasal aperture linear; rictal bristles long and rigid, reaching beyond the nostrils; tail much shorter than the wing.

I may be wrong in placing *Erythrocichla* in this group, as it appears to be more a ground bird and has a distinct likeness to *Malacocichla abbotti*.

Erythrocichla bicolor, Less.

The Ferruginous Babbler.

Brachypteryx bicolor, Less., Rev. Zool. (1839), p. 138.

Erythrocichla bicolor, Sharpe, Cat. B. M., vii., p. 551; Oates, F. B. I., i., p. 152.

Description.—As in Oates, F. B. I.

Distribution.—Extreme south of Tenasserim, extending down the Malay Peninsula to Sumatra and Borneo.

Family.—Sibiidæ.

Sexes similar; nostrils exposed; habits strictly arboreal; size medium (*Yuhina* Group small); wing moderately long; legs and feet not particularly strong.

Mr. Oates in the Fauna of India includes in his Sibiinæ a large number of genera which have nothing much in common with each other. I have divided up the family into two sub-families, *Sibiinæ* and *Yuhinæ*.

Sibiinæ.

I think this should only contain, *Sibia*, *Lioptila*, and possibly *Actinodura* and *Ixops*, these last two show a marked affinity to the *Trochalopterum* in the colour of their eggs.

Yuhinæ.

I have placed the following genera together, *Yuhina*, *Lvulus*, *Staphidia*, and *Herpornis*, they appear to form a connecting link between the *Alcippe* and the *Lioptila*. They, however, differ greatly from the latter in size and appearance, as well as in nidification.

Sibiinæ.

Have the following characteristics: wing, long and not rounded, the first four primaries graduated, the fifth and sixth equal and longest; tail long (short in *Ixops*) and graduated; legs and feet moderate; bill narrow and slightly curved; habits purely arboreal; eggs various in colouration.

The true *Sibiinæ* are strictly arboreal in habits, many going about in large family parties, and during the breeding season are extremely noisy.

They all appear to build their nests at a considerable height from the ground. Whilst the " bar-wings " (*Actinodura*) build nests of a Laughing-Thrush type at no great distance from the ground.

SIBIA, Hodgson, (1836).

Oates, F. B. I., i., p. 195.

" The genus *Sibia* contains but one species, which is remarkable for the extraordinary length of its tail. This is twice the length of its wing, and greatly graduated. "

" The bill is shorter than the head, curved down and slender and the nostrils covered by a large membrane. The rictal bristles are moderate in length." (Oates).

SIBIA PICAOIDES PICAOIDES,* Hodgson.

The Long-tailed Sibia.

Hodgson, J. A. S. B., viii., p. 38 (1839) ; Sharpe, Cat., B. M., vii., 201 ; Oates, F. B. I, i., p. 195.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Bhutan, Assam, Manipur, Chin Hills, Myitkyina Dist., Shan States and Tenasserim, Burma.

LIOPTILA, Blyth (1847).

Oates, F. B. I., i., p. 195.

" *Lioptila* only differs from *Sibia* in the length of its tail ; in the shape of bill, nostrils and wing, they are similar to that genus.

KEY, as in Oates, F. B. I.

Our knowledge of the nidification of this genus is still very incomplete, some appear to lay eggs of a very Thrush-like (Meruline) type, whilst others are recorded as laying pale spotless blue eggs.

LIOPTILLA CAPISTRATA CAPISTRATA, Vigors.

The Black-headed Sibia.

Cinclosoma capistratum (Vigors), P. Z. S. (1831), p. 56.
Sibia capistrata (Sharpe), Cat., B. M., vii., p. 403.
Lioptila capistrata (Oates), F. B. I., i., p. 196.
Description.—As in Oates, F. B. I.
Distribution.—The Himalayas from about Naini Tal to Sukhim and Bhutan.

LIOPTILA CAPISTRATA PALLIDA, Hartert.

The Pale Sibia.

Hartert, Kat. Vog. Senekenb Mus., p. 21 (1891) ; Blanford, F. B. I., App. Vol. iv., p. 481.

Description.—Similar to *L. capistrata*. Differs in being very much paler both above and below ; the breast being almost pinkish instead of bright rufous.

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*SIBIA PICAOIDES SIMILLIMA. Salvadori.

Salvadori., Ann. Mus. Civic. Genov., xiv., p. 232, 1879 ; Sharpe, Cat., B. N., vii. p. 402.

Description.—Similar to *S. p. picaoides*, Hodgson. " Differs in having flanks browner than the throat, which is slightly slaty-grey : vent and undertail coverts dull whitish ; wing spot smaller and oblong, about half the length of the corsus." Sharpe.

Habitat.—Sumatra and the Malay Peninsula

Both Dr. Sharpe and Mr. Oates note the paleness of birds from the N.-W. Himalayas.

Distribution.—N.-W. Himalayas from Hazara to about Simla.

Lioptila gracilis, McClell.

The Grey Sibia.

Hypispetes gracilis, McClell, P. Z. S. (1839), p. 159.
Malacias gracilis, Sharpe, Cat., B. M., vii., p. 100.
Lioptila gracilis, Oates, F. B. I., i,. p. 197.
Description.—As in Oates, F. B. I.
Distribution.—The Khasia and Naga Hills, Manipur and Chin Hills, Burma.

Lioptila melanoleuca melanoleuca, Tickell.

Tickell's Sibia.

Sibia melanoleuca, Tickell, Blyth, J., A. S. B., xxviii, p. 413 (1859.)
Malacias melanoleuca, Sharpe, Cat., B. M., vii., p. 405.
Lioptila melanoleuca, Oates, F. B. I., i., p. 198; Bingham, J., A. S. B., lxix., Part ii. (1900); Rippon, Ibis (1901), p. 533.
Description.—As in Oates, F. B. I.
Distribution.—Muleyit Mt. in Tenasserim, it then re-appears in the Shan States, being found along the central range up to Loi-San-Pa, and from here it again appears in the Ruby Mines District. Birds from this last locality seem to me to be much darker than those from Tenasserim, and are very like *L. m. castanoptera*, with the exception of the wing-coverts, which are chestnut in that species.

Lioptila melanoleuca castanoptera, Salvadori.

Fea's Sibia.

Malacias castanoptera, Salvadori, Ann. Mus. Civ. Gen. (2), vii., p. 363 (1889).
Lioptila castanoptera, Oates, F. B. I., i., p. 199.
Description as in Oates, F. B. I.
Distribution.—Karennee and the western ranges of the Shan States up to Kalaw. It must meet the last species *L. melanoleuca*, in some parts of their distribution, and the two species inter-breed, as there is a specimen in the British Museum of *L. melanoleuca* which shows traces of chestnut on its wings.

Lioptila annectens annectens, Blyth.

Blyth's Sibia.

Blyth, J. A. S. B., xvi., p. 450 (1847); Sharpe, Cat., B. M., vii., p. 80; Oates, F. B. I., i., p. 199.
Description.—As in Oates, F. B. I.
Distribution.—Sikhim, Khasia, Naga and Chin Hills and Manipur.

Lioptila annectens saturata, Walden.

Walden's Sibia.

Walden, Ibis, 1875, p. 352; Oates, F. B. I., i., p. 199.
Description.—Similar to *L. annectens*, differs in having the back a rich deep chestnut.
Distribution.—The eastern hills of Burma, Bhamo Hills, Shan States and Karennee.

LIOPTILA ANNECTENS DAVISONI, * Hume.

Davison's Sibia.

Hume, St. Frs., v., p. 110 (1877); Sharpe, Cat., B. M., vii., p. 80; Oates, F. B. I., i., p. 200.

Description.—"Like *L. a annectens*, Blyth, but with the back and wing coverts black; and the rump and upper tail coverts mingled black and deep ferruginous maroon." (Hume).

Distribution.—Muleyit, Mt. Tenasserim.

LIOPILA PULCHELLA, †Godwin-Austen (1874).

The Beautiful Sibia.

Sibia pulchella, Godwin-Austen, A. M. N. H. (4), xiii., p. 160 (1874).
Malacias pulchella, Sharpe, Cat., B. M., vii., p. 407.
Lioptila pulchella, Oates, F. B. I., i., p. 200.
Description.—As in Oates, F. B. I.
Distribution.—The Naga and Daphla Hills, Assam.

Sub-family.—ACTINODURINÆ.

Have the following characteristics: wing rounded and fitting close to the body, the first four primaries graduated, and the wings conspicuously barred black and chestnut; the tail greatly graduated; the bill stout and gently curved; no hairs overhanging the nostrils which are covered by a membrane; numerous long hairs on the chin and throat.

This sub-family consists of two genera, which only differ in the length of their tail.

a. Tail considerably longer than the wing...*Actinodura*.
b. Tail slightly shorter than the wing...*Ixops*.

ACTINODURA, Gould (1836).

Oates, F. B. I., i., p. 201.

"In *Actinodura* the bill is rather slender, about half the length of the head; the nostrils are covered by a very large membrane, and the rictal bristles are long and distinct. The tail is considerably longer than the wing and greatly graduated." (Oates).

KEY.

a. No white ring round the eye. *A. egertoni* and sub-species.
b. A conspicuous ring of white feathers round the eye.
a.[1]. Crown the same colour as the back. *A. r. ramasyi*.
b.[1]. Crown tinged with rufous. *A. r. radcliffei*.

Distribution.—*A. egertoni egertoni*, Gould, Nepal, Sikhim, Daphla Hills, Shengorh Peak; *A. e. khasina*, Godwin-Austen, Khasia, Naga, and Manipur Hills; *A. e. ripponi*, O.-Grant, Mt. Victoria, Chin Hills, and the Bhamo Hills; *A. ramsayi ramsayi*, Walden, Southern Shan States and Karennee; *A. r. radcliffei*, Harington, the Ruby Mines District, Burma; *A. souliei*. Oustalet, W. China and Yunnan.

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* LIOPTILA DESGODINSI, Oustalet.

Oust. and David. Bull. Soc. Philom, Paris (7), i., p. 139, 1877; Sharpe, Cat., B. M., vii. p. 406.

Occurs in Yunnan, where several specimens were procured by Col. Rippon

† LIOPTILA AURICULARIS, Swinhoe,

Swinhoe, Ibis, 1864, p. 361; Sharpe, Cat., B. M., vii., p. 405.
Habitat.—Formosa.

Key of *Actinodura egertoni* and sub-species.
(O. Grant, Ibis. 1907, p. 186.)

A e. egertoni, Gould.	*A. e. khasiana* (G. A.)	*A. e. ripponi*, O. Grant.
Forehead.		
Dark chestnut extending on to crown.	Rufous, not extending beyond eye.	Rufous, usually not extending beyond eye.
Crown.		
Darkish-grey.	Light ash-grey.	Darkish-grey.
Back.		
Reddish olive.	Ochraceous.	Greyish olive.
Middle tail feathers.		
Dark bars, usually very faint.	Dark bars, usually distinct.	Dark bars, usually distinct.
Distribution.		
Nepal, Sikhim, Daphla Hills, Shengorh Peak.	Shillong, Naga and Khasia Hills, Manipur.	Mt. Victoria, Chin Hills, (and the Bhamo Hills.)

These three forms may be easily separated by the colour of their back.

ACTINODURA EGERTONI EGERTONI, Gould.

The Nepal Bar-wing.

Gould, P. Z. S. (1836), p. 18 ; Sharpe, Cat., B. M., vii., p. 463 ; Oates, F. B. I., i., p. 201.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim and Daphla Hills.

ACTINODURA EGERTONI KHASIANA,* Godwin-Austen.

The Shillong Bar-wing.

Godwin-Austen, J. A. S. B., xv., Part ii., p. 76 (1876) ; O. Grant, Ibis, 107, p. 186.

Description.—As in Key.

Distribution.—Shillong, Khasia and Naga Hills, Manipur.

ACTINODURA EGERTONI RIPPONI, O. Grant.

Rippon's Bar-wing.

O. Grant, Ibis, 1907, p. 186; Harington, J. B. N. H. S., xix., p. 118 ; Ibis (1914).

Description.—This differs from *A. egertoni*, Gould, in not having so much chestnut on the fore head ; and the back a greyish-olive instead of reddish-olive.

I procured what I considered to be this sub-species at Sinlum in the Bhamo Hills, some birds however appearing to be nearer to *A. e. khasiana*.

Nesting.—This has been described by me in the Journal, the eggs resembling those of *A. e. khasiana*, being a beautiful pale blue marked with numerous bold spots and curls of a chocolate brown.

Distribution.—Mt. Victoria, Chin Hills and the Kachin Hills, E. of Bhamo.

* *Actinodura souliei*, Oustalet.
Oustalet, Bull. Mus. Paris, (1897), p. 164.
Distribution—W. China and Yunnan.
(I have not been able to examine this species.)

Actinodura ramsayi ramsayi, Walden.

Ramsay's Bar-wing.

Walden, A. M. N. H. (4), xv., p. 402 (1875) ; Sharpe, Cat., B. M., vii., p. 464 ; Oates, F. B. I., i., p. 202 ; Rippon, Ibis, 1897, p. 2, *ibid,* Ibis, (1901) p. 533.

Description.—As in Oates, F. B. I., in which, however, there is no mention of the conspicuous ring of white feathers round the eye.

Habits.—" The habits of this bird are very like those of *Lioptila castanoptera* ; it hops rapidly from branch to branch, frequently uttering its call. The call of *L. castanoptera* is three notes in the minor in a descending scale, preceded by a flourish ; that of *A. ramsayi* is the same without the flourish." (Rippon).

Nothing yet has been recorded about the nesting of this species which is fairly common in the hills to the east of Taunggyi. Col. Rippon states that it breeds in April.

Distribution.—The Southern Shan States and Karennee.

Actinodura ramsayi radcliffei, Harington.

The Ruby Mines Bar-wing.

Harington, Bull., B. O. C., Cl. xiii., p. 9, 1910.

Description.—" Differs from *A. ramsayi* (Walden) in having the forepart of the head and crest darker ferruginous, the general colour of the upper parts ochraceous, instead of cinereous olive-brown, and the throat, breast, and the sides of the body rich ochraceous : the abdomen is conspicuously white, and the feathers of the throat have rather conspicuous blackish shaft-streaks. Iris brown ; bill dark brown ; legs pale brown. "

Total length about 9·7 inches, culmen 0·8, wing 3·6, tail 5·0, tarsus 1·2.

Habitat.—The only specimen procured as yet, is the type, which was shot by Major H. Delmè-Radcliffe in the Ruby Mines District, Upper Burma.

Ixops, Hodgson (1844).

Oates, F. B. I., i., p. 203.

" The genus *Ixops* resembles *Actinodura*, but has the tail rather shorter than the wing, and the tail feathers less graduated." (Oates).

I can find nothing recorded as to the nesting of this genus, except that it is said to build a saucer-shaped nest, the eggs most probably will be like the *Actinodura.*

Key.

a.—Chin and throat the same colour as the breast.

a^1. Throat and breast not striped .. *I. n. nepalensis.*

b^1. " " striped.

a^2. Throat and breast greyish with dark stripes .. .. *I. n. daflaensis.*

b^2. Throat and breast rufous with chestnut stripes .. .. *I. n. waldeni.*

b.—Chin and throat chestnut, breast olive-grey .. *I. morrisoniana.*

Distribution.—*I. n. nepalensis,* Hodgson, Nepal, Sikhim, Butan ; *I. n. daflaensis,* Godwin-Austen, Daphla Hills ; *I. n. waldeni,* Godwin-Austen, Naga Hills ; *I. n. poliotis,* Rippon, Chin Hills ; *I. morrisoniana,* O. Grant, Formosa.

Ixops nepalensis nepalensis, Hodgson.

The Hoary Bar-wing.

Cinclosoma nipalensis, Hodgson, As. Res., xix., p. 145 (1836).
Actinodura nipalensis, Sharpe, Cat., B. M., vii., p. 466.
Ixops nepalensis, Oates, F. B. I., i., p. 203.
Description.—As in Oates, F. B. I.
Distribution.—Nepal, Sikhim and Butan. Birds from Sikhim appear to be more rufous on the abdomen than the Nepal ones; more specimens are required from this last locality, as Hodgson's specimens are very worn, and I believe some of his localities are doubtful, as he collected both in Nepal and at Darjeeling.

Ixops nepalensis daflaensis, Godwin-Austen.

Austen's Bar-wing.

Actinodura daflaensis, Godwin-Austen, A. M. N. H. (4), xvi., p. 340 (1875).
Actinodura daflaensis, Sharpe, Cat., B. M., vii., p. 467.
Ixops daflaensis, Oates, F. B. I., i., p. 204.
Description.—As in Oates, F. B. I.
Distribution.—Daphla and Miri Hills.

Ixops nepalensis waldeni, Godwin-Austen.

Walden's Bar-wing.

Actinodura waldeni, Godwin-Austen, P. Z. S. (1874), p. 46; Sharpe, Cat., B. M., vii., p. 465.
Ixops waldeni, Oates, F. B. I., i., p. 204.
Description.—As in Oates, F. B. I.
Distribution.—Japvo Peak; there are also 3 specimens from the Naga Hills and Manipur; these are more rufous below and show very little tract of streaking on the breast or low parts.

Ixops nepalensis poliotis,* Rippon.

Rippon, Bull., B. O. C., xv., p. 97.
Very similar to *I. waldeni*, Godwin-Austen. Differs in having head darker, and crest darker edged with grey; ear-coverts ashy, instead of silvery-grey.
I do not consider this a good sub-species, and can see very little difference between it and *I. waldeni*, of which there are only two specimens from the type locality. In fact there is much more difference between *I. waldeni* from Japvo Peak, of which there are two specimens, and the same species from Manipur and Naga Hills, of which there are three very poor specimens, than between typical *I. waldeni*, and *I. w. poliotis*, from the Chin Hills, of which there are numerous specimens in the British Museum.

Yuhinæ.

Have the following characteristics: wing and tail about equal; the first three primaries graduated; the head fully crested, the feathers of the crown lengthened; the nostrils overhung with hairs.

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* Ixops morrisoniana, O. Grant.

Actinodura morrisoniana, O. Grant, Bull. B. O. C., xvi., p. 119 (1906); Ibis (1907), p. 185.
Distribution.—Mt. Morrison, Formosa.

KEY.

a.—Bill slender and gently curved.
  a^1. Upper plumage not green .. .. *Yuhina.*
  b^1. „ „ green .. .. .. *Herpornis.*
b.—Bill stout and straight.
  c^1. Tail square .. .. *Ixulus.*
  d^1. Tail graduated .. .. *Staphidia.*

YUHINA, Hodgson (1836).

Oates, F. B. I., i., p. 211.

" In *Yuhina* the bill is about two-thirds the length of the head, greatly curved and sharply pointed; the frontal hairs and the rictal bristles are well developed, and the nostrils are covered by a large membrane. The head is fully crested. The tail is rather short and perfectly square." (Oates).

The wing is roundish with the first three primaries graduated, the fourth and fifth equal and longest; wing and tail about equal in length.

This genus is found along the Himalayas from Garhwal, to Assam and Burma, and thence into China.

They build flimsy cup-shaped nests and lay very highly coloured eggs, a pale blue green with numerous brown spots.

YUHINA GULARIS GULARIS, Hodgson.

The Stripe-throated Yuhina.

Hodgson, As. Res., xix., p. 166 (1836); Sharpe, Cat., B. M., vii., p. 631; Oates, F. B. I., i., p. 211.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Butan, Naga and Manipur Hills.

YUHINA GULARIS YANGPIENSIS, Sharpe.

Sharpe's Yuhina.

Sharpe, Bull., B. O., xiii., p. 11.

Description.—Similar to *Y. gularis*, Hodgson, differs in having upper plumage olive-brown instead of fulvous-brown, tail-coverts a very much paler olive tinge than the back; the crest brown tinged fulvous instead of a clear brown. Measurements as in *Y. gularis.*

" Legs and feet orange, upper mandible black, lower horny." (Rippon).

The type is from Yangpi, Talifu road, 5,300 ft., Yunnan. There are several similar birds collected by Col. Rippon from Mt. Victoria, Chin Hills. The birds from Naga hills are probably this sub-species which is very hard to separate from *Y. gularis.*

YUHINA OCCIPITALIS, Hodgson.

The Slaty-headed Yuhina.

Hodgson, As. Res., xix., p. 166 (1836); Sharpe, Cat., B. M., vii., p. 633; Oates, F. B. I., i., p. 212.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim and Butan.

YUHINA DIADEMATA AMPELINA, Rippon.

Rippon's Yuhina.

Rippon, Bull., B. O. C., xi., p. 12.

Harington, J., B. N. H. S., xix., p. 119; *ibid*, Ibis, 1914, p. 13.

Description.—Similar to *S. diademata*, Verr, but darker especially on the crown and throat. Measurements the same as *diademata*.

Distribution.—Yunnan and the Bhamo Hills (originally described from Warabum, E. of Bhamo and *not S. Shan States*, as entered on label of type specimen.)

Nesting and Habits.—"It is very Tit-like in its habits and notes, and continuously raises its crest and so reveals the conspicuous white patch at the back of its head. I found several nests during April at Sinlum, Bhamo District, these were all placed between the upright stems of wild raspberry bushes, from 3 to 4 feet from the ground, and were very flimsy affairs, made entirely of some black roots. The eggs, of which two seem to be the usual number, are very like small editions of *Copsychus saularis*, being of a greenish-blue ground-colour profusely spotted, more especially at the larger end, with amber-spots. Average of seven eggs = ·76×·60, largest = ·80×·60 smallest = ·75×·58.

YUHINA NIGRIMENTUM NIGRIMENTUM,* Hodgson.

The Black-chinned Yuhina.

Polyodon nigrimentum, Hodgson in Gray's Zool. Misc., p. 82 (1844).

Yuhina nigrimentum, Sharpe, Cat., B. M., vii., p. 633; Oates, F. B. I., i., p. 212.

Description.—As in F. B. I.

Distribution.—The Himalayas from Sarawal to the Dafla Hills, the Naga and Manipur Hills.

IXULUS, Hodgson (1844).

Oates, F. B. I., i., p. 216.

"*Ixulus* resembles *Yuhina* in every thing except the shape of the bill, which in *Ixulus* is shorter, deeper, and more curved at the tip." (Oates).

They have the following characteristics: wing more or less rounded, the first three primaries graduated, the fourth and fifth equal and largest; tail and wing about equal; rictal bristles weak; a few hairs overhanging the nostrils; and head crested.

They range from the N. W. along the Himalayas into Assam and Burma, and from thence to China.

KEY.

Oates, F. B. I., i., p. 217.

A.—Nape white	*I. occipitalis.*
B.—Nape without any white.	
a^1. *A distinct collar round neck.*	
a^2. A rusty yellow collar on hind neck	*I. f. flavicollis.*
b^2. A bright chestnut collar on hind neck	*I. f. harterti.*
b^1. *No collar.*	
c^2. Crown and back brown	*I. h. humilis.*
d^2. Crown brown, back greyish	*I. h. clarkii.*

IXULUS OCCIPITALIS, Blyth.

The Chestnut-headed Ixulus.

Sira occipitalis, Blyth, J., A. S. B., xiii., p. 937 (1844).

Ixulus occipitalis (Sharpe), Cat., B. M., vii., p. 613; Oates, F. B. I., i., p. 217.

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*YUHINA NIGRIMENTUM PALLIDA, De La Touche.

Rickett and De La Touche. Bull., B. O. C., vi., p. 50.

Description.—Larger than *Y. nigrimentum*. Hodgson, wing up to 59 mm. in *Y. nigrimentum* wing up to 55 mm. The underparts not fulvous, but greyish-olive.

Habitat.—Kuatun, China.

Description.—As in Oates, F. B. I.
Distribution.—Himalayas, from Nepal to the Daphla Hills.

*Ixulus flavicollis flavicollis, Hodgson.

The Yellow-naped Ixulus.

Yuhina flavicollis, Hodgson, As. Res. xix., p. 167 (1836).
Ixulus flavicollis, Sharpe, Cat., B. M., vii., p. 612; Oates, F. B. I., i., p. 218.

Description.—"Above obscure, with a slaty tinge; cap pure rich brown; cheeks and nape paler; back of the neck *rusty yellow,* continued in a collar round the sides and front of the neck, and thence spread over the lower surface of the body and diluted often to white; Chin, throat, and moustache dark brown; remiges and rectrices internally dusky; the primaries edged externally with white on the outer webs, and all pale internally on the inner; lining of wings white; sides of body shaped with brownish; legs yellowish fleshy grey; bill fleshy brown; irish brown; head crested; size 5¼"; "Nepal." (Hodgson).

Birds from Simla—
Are very pale in colour, the collar showing traces of white at the sides The tertiaries conspicuously tipped with white.

Birds from Naini Tal—
The same but tertiaries not tipped with white.

Birds from Nepal to Bhutan—
The same pale coloured collar.

Birds from Mt. Victoria—
Almost similar to those from Nepal.

Birds from Assam—
Almost identical with *I. r. harterti,* collar a rich chestnut.

Distribution.—The Himalayas from the Sutlej Valley to Bhutan, appearing again in the Chin Hills; birds from Assam have a very chestnut collar and are the next sub-species.

Ixulus flavicollis harterti, Harington.

The Chestnut-naped Ixulus.

Harington, Bull., B. O. C. xxxiii., p. 62 (1913).

Description.—Adult: Similar to *I flavicollis,* Hodgson, from Nepal, but differs in having the crest of a darker and richer brown; the collar of a deeper and brighter chestnut, and the back of a much darker olive-brown. In *I. flavicollis* the collar is pale rufous.

Habitat.—The Bhamo Hills and Trans-Salween Shan States, Burma.

Type in the Tring Museum: No. 232. ♀. Sinlum, Bhamo, 25-4-08. H. H. Harington coll.

Obs.—Birds from Assam are almost identical with examples from Burma; those from the Chin Hills (Mt. Victoria) approach nearer to *I. flavicollis* from Sikhim.

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* *Ixulus flavicollis baileyi,* S. Baker. Bull., B. O. C., xxxv, p. 17, 1914 "General plumage paler than in *I. f. flavicollis* and the white sharp lines extending over the whole of the upper parts instead of being confined to the scapulars and upper back; car-coverts pale grey instead of pale bronze brown as in *I. f. flavicollis* and the brown of the crown and crest much paler and duller, with pronounced pale shafts to the feathers.

Habitat.—Mishmi Hills.

[The above was published after Maj. Harington's paper was in type and it has not been possible to add this new race to the key.—Eds.]

This is a very common little bird up at Sinlum-kaba in the Bhamo Hills. It has not been recorded from the Southern Shan States, but re-appears on the Salween-Mekong water shed in Keng-Tung State.

I found its nest at Sinlum, this was cradle-shaped and composed of moss. The eggs are identical with those *I. f. flavicollis*, that species is said to either build a cradle-like nest or place its nest on the ground.

Ixulus humilis humilis, Hume.

Davison's Ixulus.

Ixulus humilis, Hume, St. Frs., v., p. 106 (1877); Sharpe, Cat., B. M., vii., p. 614; Oates, F. B. I., i., p. 218.

Description.—As in Oates, F. B. I.

Distribution.—Muleyit Mt., Tenasserim.

Ixulus humilis clarkii,* Oates.

Oates' Ixulus.

Oates, Bull., B. O. C., iii., p. 41 (1894); Ibis (1894), p. 481; Blanford, F. B. I., iv., App., p. 481; Bingham, Ibis. (1903), p. 591.

Description—As in F. B. I.

A rare bird at present, only recorded from Byingyi, an isolated hill of 6,200 ft., situated on the edge of the Shan Plateau, where it has been obtained both by Mr. Oates and Col. Bingham. It possibly extends into Karennee.

"I found this bird very common on Byingyi, in small parties, searching the blossoms of small trees for insects." (Oates, Ibis, 1894.)

Staphidia, Swinhoe (1871).

Staphidia have the following characteristics: wing the *first three* primaries graduated, the fourth and fifth equal and longest; wing and tail about equal in length, the latter greatly graduated; nostrils overhung by hairs; rictal bristles short and weak; head crested.

Key.

A. A distinct chestnut collar ..... *S. torqueola.*
B. Collar indistinct or wanting.
  a^1. Crown and nape bright chestnut ..... *S. everetti.*
  b^1. Crown rufous, nape same colour as back.. *S. castaneiceps.*
  c^1. Crown dark grey, a white supercilium .. *S. rufigenis.*
  d^1. Crown dark-brown, no white supercilium *S. striata.*

Staphidia castaneiceps, Moore.

The Chestnut-headed Staphidia.

Ixulus castaneiceps, Moore, P. Z. S. (1854), p. 141.

Staphidia castaneiceps, Sharpe, Cat., B. M., vii., p. 616; Oates, F. B. I., i., p. 205.

Description.—As in Oates, F. B. I.

Distribution.—The Garo, Khasia, Naga, Manipur and Chin Hills.

Nesting.—(See J., B. N. H. S., vol. viii).

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* Ixulus rouxi, Oustalet.

Oustalet, Mus. Paris, 1896, p. 186.

Habitat.—W. China and Yunnan.

Staphidia striata rufigenis, Hume.

Hume's Staphidia.

Ixulus rufigenis, Hume, St. Frs. v., p. 108 (1877); Sharpe, Cat., B. M vii., p. 617; Oates, F. B. I., i., p. 206; Rippon, Ibis, 1901, p. 533.

Description.—As in Oates, F. B. I.

Distribution.—Sikhim, Bhutan, and hill ranges of Assam. Also said t occur in the Shan States. I think that all the Staphidia procured on th eastern side of Burma are the next sub-species, *S. s. striata*, as a specime of mine from the Bhamo Hills, and those in the B. Museum from the Sha States are all very similar, and much nearer to *S. s. striata* from Karenne than to *S. s. rufigenis* from Sikhim.

Nesting.—Baker, Ibis, 1906, p. 110, says it builds in holes of banks making a nest of moss and leaves lined with fibres. The eggs are whitis spotted brown, and measure ·58 to ·57 × ·50 inches.

Staphidia striata striata, *Blyth.

Tickell's Staphidia.

Ixulus striatus, Blyth, J., A. S. B., xxviii., p. 413 (1859).

Staphidia striata, Sharpe, Cat., B. M., vii., p. 617; Oates, F. B. I., i., p 206; Bingham, Ibis (1903), p. 590; Harington, Ibis (1914), p. 14.

Oates is not very clear in his description of this species, never havin seen it. Fortunately there are several specimens now available both in th British Museum and at Tring. To make matters more certain Mr. C Grant kindly procured Count Salvadori's specimen for me to compar with mine. This bird is said to be identical with Fea's birds fro Tenasserim.

Description.—" General colour above dull olive-brown; head darker wit a greyish tinge, in some specimens a sooty-brown. The feathers of the hea mantle and back with white shaft stripes. Ear-coverts dull chestnu sides of the neck faintly tinged with the same. Wings and tail the sam colour as the back but darker. The three outer tail feathers broadl tipped with white, under parts dull greyish-white. Length about 5, win 2·37 inches and tail the same."

In fact *S. striata* is very similar to *S. rufigenis*, but has the head browner and the grey supercilium with rufous band above wanting, and has a indistinct rufous collar at the back of the neck.

The ear-coverts seem to vary from a dull chestnut to a bright chestnu similar to *S. rufigenis*.

Distribution.—Originally described from Tenasserim, has since bee procured at Thandoung near Toungoo, where it is fairly common; and a Byingyi. It no doubt occurs in suitable localities along the easter hills in Burma up to the Bhamo District.

Nesting.—Builds a mossy nest lined with fibres, which is placed in hole of a bank or cutting eggs similar to *S. rufigenis*. The Hon. Mr. S. M Robinson informs me in a letter, that he found this little bird very commo

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* Staphidia torqueola, Swinhoe.

Swinhoe, A. M. N. H. (4), p. 174 (1870); Sharpe, Cat., B. M., vii., p. 615.
Distribution.—W. Fokien, China.

Staphidia evretti, Sharpe.

Sharpe, Ibis, 1887, p. 447.
Distribution.—N. W. Borneo.

up at Thandoung in the Shan States, where he found several nests. It appears to be very partial to nesting in certain favourable spots, many nests being found close together. Also that they seem to desert their nest for no apparent cause, as he found many nests deserted containing 2 and 3 eggs.

Herpornis, Hodgson (1844).

Oates, F. B. I., i., p. 219.

"In *Herpornis* the bill is nearly as long as the head, slender but well bent down at the tip; the nostrils are covered by a few frontal hairs, and the rictal bristles are strong; the head is crested; the wing is rather long and pointed and the tail perfectly square."

The plumage green. (Oates).

Herpornis xantholeuca, Hodgson.

The White-bellied Herpornis.

Erpornis xantholeuca, Hodgson, J., A. S. B., xiii., p. 380 (1844).
Herpornis xantholeuca, Sharpe, Cat., B. M., vii., p. 636; Oates, F. B. I., i., p. 219.

Description.—As in Oates, F. B. I.

Distribution.—Himalayas, Nepal to Assam, Cachar, Manipur, the whole, of Burma, and extending down the Malay Peninsula.

I can find nothing recorded as to its nidification, although its eggs have been taken.

Family—Liotrichidæ.

Sexes dissimilar; habits arboreal; size small; bill short; wing and tail about equal.

This sub-family consists of a collection of small birds only having the above points in common. Dr. Sharpe has removed a great number of genera, which were included by Mr. Oates; I think the following should also be removed, *Cutia*, *Pteruthius*, *Hilarocichla*, and possibly *Myzornis*, only leaving the following three genera, which are true *Timeliidæ*, *Mesia*, *Liothrix* and *Minla*.

Liothrix, Swainson.

Oates, F. B. I., i., p., 221.

The genus *Liothrix* consists of one species, and its two geographical races, and is characterised by its forked tail, the feathers of which are bent outwards.

Liothrix lutea calipygus,* Hodgson.

The Indian Liothrix.

Bahila callipyga, Hodgson, Indian Rev. (1838), p. 88.
Liothrix lutea, Sharpe, Cat., B. M., vii., p. 644. Oates, F. B. I., i., p. 221.
Description—As in Oates, F. B. I.

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* Liothrix luteas luteas, Scop.

The Chinese Liothrix.

Sylvia lutea.—Scop Del. Flor et Faun Insule, ii., p. 96 (1786).
Liothrix lutea, Seebhom, P. Z. S., 90, p. 343.
Habitat.—China.

The sub-specific name *lutea* belongs to the Chinese race which differs from the Indian, in having the tail more forked, and a decided red patch in the middle of the primaries, very similar to that of *M. argentauris*.

Distribution.—The Himalayas, Simla to Bhutan, the Assam Hills, and possibly the Chin Hills, also in the Bhamo Hills, where I procured it.

Mesia, Hodgson (1838).

Oates, F. B. I., i., p. 244.

"The genus *Mesia* contains two species, one of which is found within our limits. The coloration of this genus is very pretty."

"In *Mesia* the bill is stout, about half the length of the head, slightly notched near the tip, and with the culmen curved ; the nostrils are covered by a peculiarly shaped membrane, and the rictal bristles are strong. The head is sub-crested ; the wing rounded ; the tail very slightly graduated, and the foot strong." (Oates).

Mesia argentauris, Hodgson.

The Silver-eared Mesia.

Mesia argentauris, Hodgson, Ind. Rev. (1838), p. 88 ; Sharpe, Cat., B. M., vii., p. 642 ; Oates, F. B. I., i., p. 244.

Description—As in F. B. I.

Distribution.—The Himalayas from Garhwal to Assam and Manipur, the Bhamo, Shan States and Karennee down to Tenasserim.

Minla, Hodgson (1838).

Oates, F. B. I., i., p. 245.

"The genus *Minla*, as I restrict it, contains one Indian bird of pleasing plumage, found on the Himalayas and on some of the hill-ranges of Assam."

"In *Minla* the bill is slender, curved, notched and pointed. The head sub-crested, the wing rounded, and the tail, which is as long as the wing, slightly graduated." (Oates).

Minla igneitincta,* Hodgson.

The Red-tail Minla.

Hodgson, Ind. Rev. (1838), p. 33 ; Sharpe, Cat., B. M., vii., p. 606 ; Oates, F. B. I., i., p. 245.

Description—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Bhutan, Manipur, the Naga Hills, and Bhamo Hills.

Myzornis, Hodgson (1843).

Oates, F. B. I., i., p. 233.

"In *Myzornis* the bill is slender and nearly as long as the head, distinctly notched, with the culmen gently curved, the nostrils are longitudinal and covered by a membrane ; the rictal bristles weak. The head is not crested, but the feathers of the crown somewhat lengthened. The wing is round ; the tail is about two-thirds the length of the wing and slightly rounded, and the tarsus is long and slender." (Oates).

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* *M. jerdoni*, Verreaux.

Verr. Nouv. Arch. Mus., vi., Bull., p. 38 (1870).
Habitat.—Szechnen, W. China.

Myzornis pyrrhura, Hodgson.

Hodgson, J., A. S. B., xii., p. 984 (1843); Sharpe, Cat., B. M., vii., 635; Oates, F. B. I., i., p. 233.

Description—As in Oates, F. B. I.

Distribution.—Nepal and Sikhim. Nothing authentic appears to be recorded about its nidification.

Cutia, Hodgson (1836).

Oates, F. B. I., i., p. 222.

The genus *Cutia* is remarkable for the great development of the tail-coverts, which reach nearly to the tip of the tail. The genus contains only one species, both sexes of which are very handsomely coloured." (Oates).

This is most certainly a non-Timeliine species, and I think should be removed from the family. Nothing appears to be recorded as to its habits and nidification, which might throw some light as to which family it should belong.

Cutia nepalensis,* Hodgson.

Hodgson, J., A. S. B., v., p. 774 (1836); Sharpe, Cat., B. M., vii., p. 646; Oates, F. B. I., i., p. 222.

Description—As in Oates, F. B. I.

Distribution.—The Himalayas from Nepal to the Daphla Hills, the Assam, Manipur, Naga, Chin Hills, and Shan Hills to Karennee.

Note.—Birds from Mt. Victoria Chin Hills are very much paler above, and not so heavily barred on the flanks, the tail-coverts also much paler.

Pteruthius.

Oates, F. B. I., i., p. 223.

"The bill is about one-half the length of the head, strongly hooked at the tip, and with the margins sinuated; the rictal bristles are weak. The nostrils are oval and partially covered by the frontal bristles, which are well developed. The feathers of the crown are somewhat ample, but they do not form a crest." (Oates.)

"The wing is rounded, the tail is about two-thirds, the length of the wing and slightly rounded, and its coverts reach to the middle of the tail. The tarsus is strong and smooth." (Oates.)

The Shrike-Tits are most certainly non-Timeliine, and I think should be placed near the Wood-Shrikes (*Tephrodornis*), whom they resemble, in structure, habits, and nidification, only differing in the sexes being dissimilar in plumage.

Key as in F. B. I.

Pteruthius erythropterus, Vigors.

Lanius erythropterus, Vigors, P. Z. S. (1831), p. 22.

Pteruthius erythropterus, Gadow, Cat., B. M., viii., p. 113; Oates, F. B., i., p. 224.

Description.—As in Oates, F. B. I.

Distribution.—The Himalayas, Hazara to Assam, Manipur, Naga and Chin hills.

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* Cutia cervinicrissa, Sharpe.

P. Z. S. (1888), p. 276.

Habitat.—The mountains of Perak, Malay Peninsula.

PTERYTHIUS ÆRALATUS ÆRALATUS,* Tickell.

Tickell's Shrike-Tit.

Tickell, J., A. S. B., xxiv., p. 267 (1855) ; Gadow, Cat., B. M., viii., p. 114 ; Oates, F. B. I., i., p. 225.

Description.—As in Oates, F. B. I.

Distribution.—The Hills on the eastern side of Burma from the Myit Kyina District down to the Malay Peninsula.

PTERUTHIUS MELANOTIS MELANOTIS, Hodgson.

The Chestnut-throated Shrike-Tit.

Hodgson, J., A. S. B., xvi., p. 448 (1847) ; Gadow, Cat., B. M., viii., p. 117; Oates, F. B. I., i., p. 226.

Description.—As in Oates, F. B. I.

Distribution.—Himalayas, Nepal to Assam, Manipur and Naga Hills.

PTERUTHIUS MELANOTIS INTERMEDIUS, Hume.

Hume's Shrike-Tit.

Allotrius intermedius, Hume, S. F. V., p. 112 (1877).

Ptererythrius intermedius, Gadow, Cat., B. M., viii., p. 117 ; Oates, F. B. I., i., p. 227.

Description.—As in Oates, F. B. I.

Distribution.—The Eastern hills of Burma from Bhamo to Tenasserim.

PTERUTHIUS XANTHOCHLORIS XANTHOCHLORIS, Hodgson.

The Green Shrike-Tit.

Hodgson, J., A. S. B., xv., i., p. 448 (1847) ; Gadow, Cat., B. M., viii., p. 118 ; Oates, F. B. I., i., p. 227.

Description.—As in Oates, F. B. I.

Distribution.—Nepal and Sikhim.

PTERUTHIUS XANTHOCHLORIS OCCIDENTALIS, Harington.

The Simla Shrike-Tit.

Harington, Bull., B. O. C., xxxiii, p. 81 (1913).

Description.—"Similar to *P. x. xanthochloris*, Hodgson, but the male has the crown and nape pale ash-grey instead of blackish. In the female the head is greenish, with a wash of grey instead of dark grey."

"Mr. Oates has already drawn attention to the fact that birds from Nepal and Sikhim have the head much darker than those from the N. W. Himalayas." (Harington).

Distribution.—The N. W. Himalayas.

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* *P. æralatus ricketti*, *O. grant.*

Bull. B. O. C., xiv., p. 92.

Habitat.—South China, Kuatun, Foh-kien and S. Yunnan.

Also the following are recorded :—

P. cameranoi, Salvadori, Sumatra.
P. tahanensis, Hartert, Malay Peninsula.
P. flaviscapus, (Temm) Java.
P. ænobarbus. (Temm) Java.

* PTERUTHIUS XANTHOCHLORIS HYBRIDA, Harington.

The Chin Hills Shrike-Tit.

Harington, Bull., B. O. C., xxxiii., p. 81. (1913).

Description.—Intermediate between *P. x. pallidius*, David, from China and *P. x. xanthochloris*, Hodgson, from Nepal, having the white ring round the eye of the former, but the grey of the head confined to the crown and nape, and not extending on to the upper back as in the former species. The colouration of the under parts is similar to that of *P. x. xanthochloris*.

Habitat.—Mt. Victoria Chin Hills.

HILAROCICHLA, Oates (1889).

Oates, F. B. I., i., p. 243.

Mr. Oates has separated off this species from the other Shrike-Tits (*Pteruthius*) on account of its longer tail. But why he should have called it a "Laughing Thrush," and thus taken a very good generic name, which would have been most useful in dividing off the *Garruiax*, is difficult to say.

HILAROCICHLA RUFIVENTER, Blyth.

Pteruthuis rufiventer, Blyth, J., A. S. B., xi., p. 18 (1843); Gadow, Cat. B. M., viii., p. 115; Oates, F. B. I., i., p. 243.

Description.—As in Oates, F. B. I.

Distribution.—Nepal, Sikhim, Naga and Chin Hills.

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* P. X. PALLIDUS, David and Oustalet.

David, Ois. Chini, p. 215.

Habitat.—Foh-kien and Yunnan.

Differs from *P. x. xanthochloris*, in having a white ring round the eye, the grey of the head confined to the nape, and the flanks greenish-yellow.

A REVISION OF THE GENUS *GENNÆUS*.

BY

E. C. STUART BAKER, F.Z.S., F.L.S., M.B.O.U.

(*With 3 Plates and 2 Maps.*)

Since 1890, consequent upon the opening up of Burmah and the adjacent States, more especially the Eastern Chin Hills, Shan States, and other districts in the East and North-East, a great number of skins have been obtained of both Kalij and Silver Pheasants, species which had hitherto been represented in Museums by very few specimens. From time to time, as these skins came to hand, many species were described as new, generally upon single specimens only, and sometimes upon mere fragments. In regard to some of the species thus named, the receipt of further material has rendered naturalists, including those responsible for the new names, doubtful as to the specific value of the alleged differences.

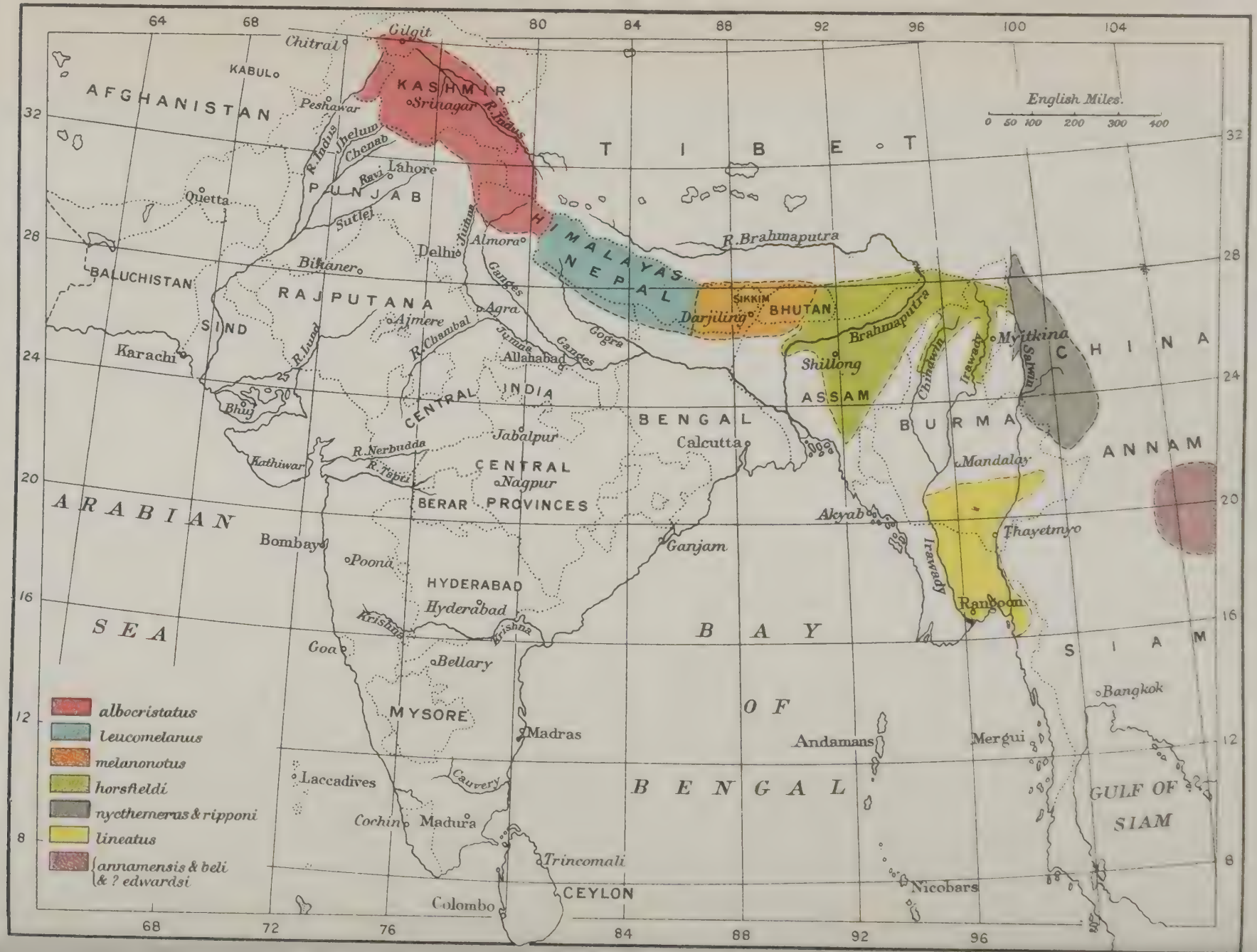
In 1909, Professor Ghigi attempted a revision of this genus in Mem. Acad. Scient. Bologna, pp. 133-174, and in this article accepts twenty-four species as good, besides describing a large number of individuals as hybrids. It is self-evident, however, that, at least in some cases, Ghigi had not before him the actual specimens upon which he discourses. Thus he dwells upon the supposed differences between *Gennæus jonesi* and *Gennæus ripponi*, although these two so-called species are described, by Oates and Sharpe respectively, from one and the same skin.

Further, we find that in some cases members of the same brood have been divided into two or more species, whilst in yet other instances the cock and hen of a pair of birds have been considered to be different, possibly owing to the fact that at the time they were named, the conditions under which they had been shot were not known to the namer.

It appears therefore that a further revision of this beautiful genus is urgently required. Before, however, considering in detail which of the very numerous forms hitherto described as species are really entitled to this rank and which are, on the other hand, merely sub-species, hybrids or individual variations, it may be as well to consider briefly the genus as a whole, more especially in reference to the way in which these variations may have arisen.

The genus *Gennæus* includes the birds generally known by the trivial names of Kalij and Silver Pheasants, and is one which gives a most interesting and, at the same time, exceptional insight into Nature's evolution of species and sub-species.

Amongst the pheasants we are considering, there appear to be three dominant types, the principal characteristics of which seem to


English Miles.
0 50 100 200 300 400
AFGHANISTAN
KABUL
Chitral
Gilgit
KASHMIR
Srinagar
R. Indus
Peshawar
R. Indus
Jhelum
Chenab
Ravi
Lahore
PUNJAB
Quetta
Sutlej
TIBET
HIMALAYAS
NEPAL
Delhi
Jhilum
Almora
R. Brahmaputra
BALUCHISTAN
Bikaner
RAJPUTANA
Ganges
Agra
SIKKIM
BHUTAN
Darjiling
Ajmere
R. Chambal
Jumna
Ganges
Gogra
Brahmaputra
Myitkina
CHINA
SIND
Karachi
R. Luni
Allahabad
Shillong
ASSAM
Chindwin
Irawady
Sakwin
Bhuj
CENTRAL INDIA
BENGAL
BURMA
Jabalpur
Calcutta
ANNAM
R. Nerbudda
Kathiwar
R. Tapti
CENTRAL
Nagpur
Mandalay
BERAR PROVINCES
Akyab
Thayetmyo
ARABIAN
SEA
Bombay
Poona
Ganjam
Irawady
HYDERABAD
Hyderabad
Rangoon
Krishna
Krishna
BAY
OF
BENGAL
SIAM
Goa
Bellary
Bangkok
MYSORE
Madras
Andamans
Mergui
Laccadives
Cauvery
GULF OF SIAM
Cochin
Madura
Trincomali
Nicobars
CEYLON
Colombo
albocristatus
leucomelanus
melanonotus
horsfieldi
nycthemeras & ripponi
lineatus
annamensis & beli
& ? edwardsi

be connected with certain well-defined geographical and climatic factors.

The first type is that of the Kalij Pheasants, in which black on the upper plumage is the prevailing tint in the males; secondly, we have the birds of the *lineatus*, or Burmese Silver Pheasant, group, in which the upper plumage is grey, this tint being obtained by fine lines and vermiculations of black and white; and, thirdly, we have the *nycthemerus* or Chinese Silver Pheasant group, in which white greatly preponderates over the black.

There are thus three well-defined and constant forms to be found in three equally well-defined areas, but between these three forms and in intervening areas we come across numerous others, more or less stable, which link them together.

An examination of the country inhabited by the three principal forms shows that the following geographical and climatic factors appear to be the ones which are mainly instrumental in the determination of the characteristics peculiar to each species.

Thus we find that the black and very dark birds inhabit areas of dense forest at comparatively low elevations where there is a heavy rainfall, and which are therefore well provided with rivers, lakes and swamps. Next we see that the grey birds inhabit hills of moderate height covered with mixed forest, bamboos and grass lands, and with a moderate rainfall. Thirdly, we obtain the white birds only in hills and plateaus at a considerable elevation where the grass-covered and open country exceeds in extent the forest, and where the rainfall is light or even scanty.

We thus have it demonstrated that great humidity and heat, with its constant tropical growth of vegetation, induces black in the plumage of the birds of this genus, whereas the coldness of the higher mountains combined with a drier atmosphere and its consequent thinner forests and more open grass lands induces white. These four factors, temperature, humidity, elevation, and vegetable growth, we shall find, therefore, are the principal ones governing not only the differentiation of the species, but also of the intermediate sub-species. An examination of the maps accompanying this article will show how this reasoning is borne out, and will make it easier to understand.

It would seem very probable that in this genus the oldest form is *horsfieldi*, a species which has established itself over a very wide area, extending from the West of Assam right away to the North-West of the Shan States, wherever the valleys of the rivers afford it sufficient heat, humidity and cover. To the West we find it replaced by certain other forms, *albocristatus*, *leucomelanus* and *melanonotus*, birds which are very similar in general appearance, but with more white in the plumage of those which ascend to higher elevations. The differences in rainfall and vegetation are not,

however, in nearly so great a contrast as they are in the further East, hence the differences in plumage are themselves less startling.

To the South the extension of *horsfieldi* appears to have been very gradual, and the variations between the extremes of type, that is to say, between the black Kalij in the North and the grey Silver Pheasant in the South-East, have in some areas become practically constant and well-defined, and may, therefore, well rank as sub-species. Thus we have *cuvieri*, a very dark bird with a small amount of white vermiculation on the upper plumage, which acts as a sort of buffer state between *horsfieldi* and other forms in the South and East which more nearly resemble the true Silver Pheasants. This form extends from Arakan round in a rough horse-shoe to the North-West Shan Hills.

South of this as the Hills get higher and drier in the South Arakan Yomas, we get a paler bird, which is very close to *lineatus*, but is darker, and still shows signs of the white banded rump typical of true *horsfieldi*. This form has been named *oatesi* by Ogilvie-Grant, and is sufficiently constant in colouration throughout the Southern Arakan Yomas to deserve sub-specific rank. East of the Irrawaddy River we get into a region of higher hills with a smaller rainfall than on the West, and accordingly we here come on a yet paler form which has lost all trace of the barred rump, contrasting with the rest of the upper plumage. This is the true *lineatus*, and it is almost entirely confined to the Pegu Yomas running North and South between the Sittang and Irrawaddy Rivers.

Extension further South seems to have practically stopped at this point, and there then appears to have set in a new movement extending North and East.

That this extension in the East has not proceeded Southwards from the Himalayas simultaneously with that on the West is shewn by the fact that the greatest contrast between any two forms is that shown between *nycthemerus* and *horsfieldi*, which practically meet one another in the extreme North-East of the Silver Pheasants' habitat. Moreover, from the birds on the East we find that all trace of the barred rump so typical of *horsfieldi* has been eliminated, whereas this feature exists in all birds down the West Coast, and does not totally disappear until the true *lineatus* is reached.

Another feature which would seem to prove that extension has been South and then again North and East is shown by the fact that hybrids are far more numerous on the extreme North-East, at the point of contact between *nycthemerus* and *horsfieldi* than they are anywhere else. Had extension commenced working down the East, then hybrids would have disappeared in some intermediate form, or have become established as a definite sub-species.

Working North and East, we find the amount of white still gradually increasing in extent, until in the North we come to the

true *nycthemerus* and in the East to *whiteheadi*, magnificent birds in which the upper plumage at a slight distance appears to be pure glistening white. These birds, as we should expect, inhabit the highest elevation, and the most open country of all the Silver Pheasants.

In the country between these two birds and *lineatus* exist numerous varieties and forms, though it is here rather more difficult than in the West of Burmah to define many areas in which we can say that such and such a type will constantly be found to the exclusion of others.

To the East of the Pegu Yomas and across the Sittang River we have a dark bird, little whiter on the whole than *lineatus*, but with the character of the markings considerably altered, the fine vermiculations in that bird giving place to well-defined, though narrow, bars or lines of white and black. As regards the male of this form, it is difficult to distinguish it from the form of Silver Pheasant found to the due North of the range of *lineatus*, though it is on the whole darker, but the females are quite different, the underparts being red in *lineatus* and its Northern form, and almost black in this bird. It is therefore worthy of distinction as a sub-species, and will stand as *sharpei*.

To the East we pass through intervening forms which have been called *beli*, *annamensis* and *edwardsi* to *whiteheadi*. The last bird is mainly white, being distinguished at a glance by the great width and boldness of the few black bars on the tail and upper plumage. The intermediate forms between *whiteheadi* and *sharpei* are distinguished by the fact that they have far more white on the long feathers at the sides of the upper breasts, a few of their feathers being pure white, a feature which obtains only in these two forms, and in *whiteheadi*. The female of *annamensis* is like that of *horsfieldi* with the tail of *lineatus*. *Beli* and *annamensis* only differ in depth of colour, and it is doubtful if both are worthy of separation as sub-species; more material is required to settle this point.

I have not been able to examine the type of "*edwardsi*," but it will almost certainly prove to be different to either *beli* or *annamensis*, if these are themselves different to one another, but, if it is the same, *edwardsi* having been described in, 96 will have priority over the other names.

Further, due North, practically from latitude 21°, we have the multitude of so-called species named by Oates inhabiting the South and North Shan States. These different species, however, have often been named from specimens inhabiting the same place; sometimes, indeed, as in the case of *atlayi* and *rufipes*, from birds of the same flock, and it is quite impossible to recognize as valid the numerous names Oates has given.

Roughly speaking, as we work North and East, the birds become more and more white in plumage, and possibly also get a longer tail, but the whitest of those which Oates has named *jonesi* and Sharpe *ripponi* are, in a few cases, quite indistinguishable from a specimen of *nycthemerus* from as far East as Fokhien. It is therefore with some hesitation that I have given sub-specific rank to the very white birds with long tails which are found in the extreme North-East in the inter Salwin-Mekong District. As regards the birds inhabiting the Ruby Mines and country North, South, and East thereof, I consider that there are not at present grounds to differentiate more than one sub-species which will be Oates' *rufipes*, that name having priority amongst those not given to birds which are palpably hybrids.

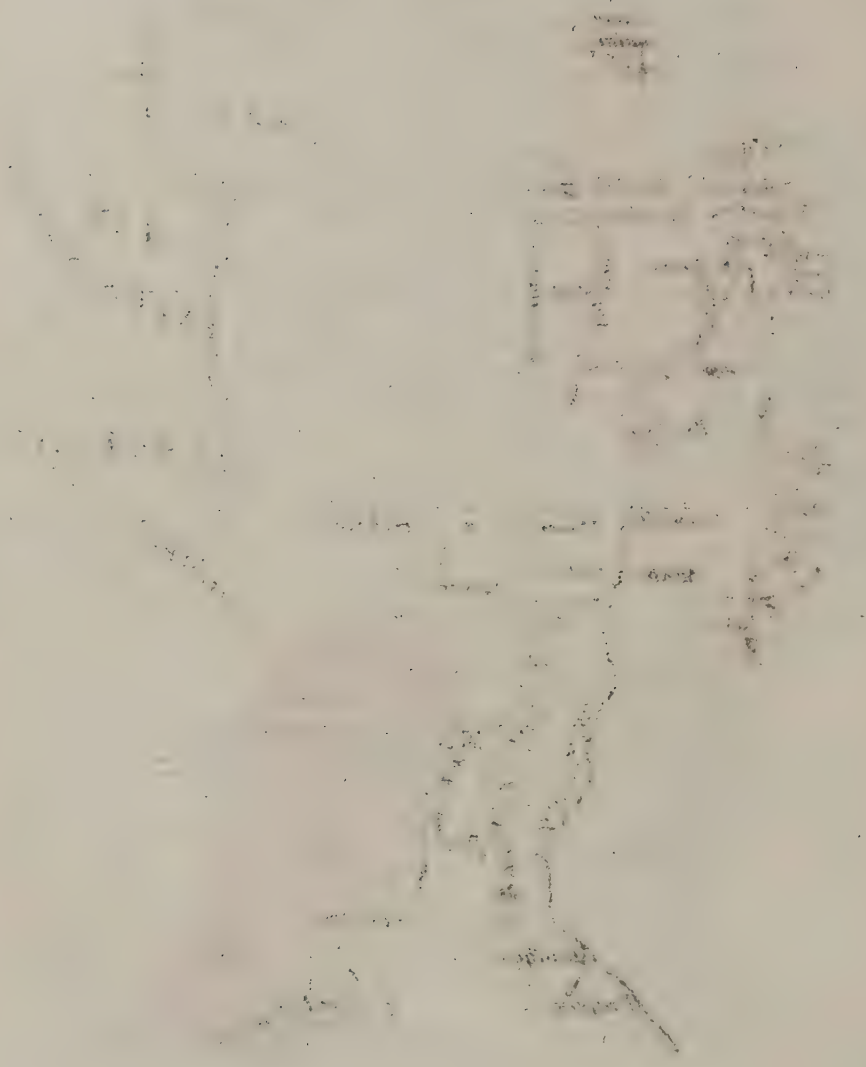
Before, however, leaving this area, it is necessary to refer to the fact that we here find some birds with dark greenish and horn coloured legs, though the vast majority have them red. Oates has deemed this sufficient ground for differentiation into species, but it appears to me that the dark legs are due either to a throw back or to direct hybridization. Birds which cannot be otherwise distinguished, and which live at the same elevation, in the same forest or grass land, and shot on the same day, have in some cases had red, and in others dark coloured legs, and in one instance a fine male was shot which had one leg red and one dark horny green.

We must also remember that round this North-Eastern area a further complication in evolution has arisen, for, whilst the majority of birds have been extending due South from the normal habitat of *horsfieldi*, others have been extending South-East towards the Northern Shan States and here the Eastern extension meets that which has worked first South-East, and then North-East. Moreover, here also the extreme Eastern limit of the typical black *horsfieldi* runs into the area occupied by the typical white *nycthemerus*. True, these two species normally occupy areas of quite different elevation of country which contrast greatly with one another in their main characteristics, but all pheasants are great travellers and wanderers, and the numerous birds shot shewing self-evident signs of being hybrids prove that interbreeding does go on between the two species, due either to the one species wandering above, or the other descending below, its normal habitat.

In the second line of extension which has pushed from West to East, the forms attained to pass through *cuvieri*, to which I have already referred, to a very well-defined form, *williamsi*, inhabiting a tract of low and moderately high hills in the inter Manipur-Chindwin and Irrawaddy District. This form is a parallel evolution to that of *oatesi* on the South, but whereas some climatic factor has induced tiny bars and vermiculations in the South, in the East a

Bale & Danielsson

MAP TO SHEW DISTRIBUTION OF SUB SPECIES OF GENNAEUS IN BURMAH & ADJOINING DISTRICTS



somewhat similar grey tone has been evolved with the assistance of much broader bars and streaks of black and white.

The above then shows roughly how in the triangle containing Assam, the Northern Shan States and Tennasserim, certain species and sub-species of Pheasants have answered to the demands of evolution. But in addition to these which are worthy of specific and sub-specific rank there are a great number of specimens in Museums which shew by certain well-known signs that they are but hybrids, and many others which cannot with certainty be assigned to any recognized form, for every area inhabited by a species or sub-species, is surrounded by another area in which the governing factors are themselves intermediate, and are not sufficiently strong to determine to which species or sub-species the birds inhabiting it shall belong.

Where also the change in the characteristics of a country is very abrupt, in consequence of which two very different forms of Pheasant closely approach one another, at this point of contact there will be found a comparatively large number of specimens which are the result of hybridization pure and simple rather than of the gradual formation of a new sub-species.

In the Shan States man has proved a recent additional factor in the differentiation of form. He has cultivated highlands which were originally under forests, but has then deserted this cultivation and left behind him wide extents of grass. In some cases he has thus adapted the country to such birds as seek the open, and in others he has driven the forest-loving birds into valleys and pockets so small that the surrounding forms are gradually, by constant hybridization, exterminating all signs of their origin.

This I have little doubt is the main cause, together with the fact that here three streams of extension meet, why we find such a curious medley of forms in the North-Western Shan States.

Finally, before leaving the consideration of the genus as a whole, it is necessary to emphasize two facts, first, that individual variation in both species and sub-species is very great, and, secondly, that alterations in plumage occur at every moult until the birds are two or three years old. In the male birds, these variations occur principally in the depth of the black and tone of its gloss, the width of the black and white markings, and, to a lesser degree, in their disposition and character. In females the differences consist principally in the general tone, varying from chestnut to dull grey brown, and in the breadth and darkness of the markings on the lower plumage; the tails in this sex perhaps vary more than the rest of the plumage and are sometimes almost a chestnut red, sometimes a dull brown, and sometimes well stippled or barred with darker marks. To work out the variations and assign to each a cause or an age is not possible with the material at hand, but

undoubtedly from what I have personally learnt from long residence in their country, it would seem that young birds are more chestnut than old ones, and that young cocks are brighter, darker, and more boldly marked than hens which they, otherwise, closely resemble.

It will be seen that in the following pages I admit altogether only eight species of this genus, *Gennæus*, together with eight sub-species as follows :—

Species.	Sub-species.
albocristatus.	
leucomelanus.	
melanonotus.	
horsfieldi	*cuvieri.*
	williamsi.
lineatus	*oatesi.*
	sharpei.
nycthemerus	*ripponi.*
	rufipes.
	annamensis.
	beli.
(*edwardsi ?*)	(*edwardsi ?*)
whiteheadi.	
swinhoii.	

As regards the sub-species, these are somewhat arbitrarily allotted to certain species, as in many cases they are half-way between two extreme forms, so that it is impossible to say to which they are nearest. This is especially the case in regard to *sharpei*, *annamensis* and *beli*. In general appearance these three are very closely allied and would at first sight appear to be sub-species of one and the same bird, and they might with equal reason be all placed under either *nycthemerus* or *lineatus*. Indeed the two latter might almost equally correctly be placed as sub-species of *whiteheadi*, a Pheasant inhabiting Hainan, an island far to the East of them, for they show a striking affinity to this bird in their white breast plumes. The present arrangement seems, however, to be on the whole the most convenient, and as all classification is, or should be, made entirely on the grounds of convenience, it is probably therefore the most scientific.

Of the species admitted *leucomelanus* alone is at all doubtful, and this bird may be considered by some people to be only a sub-species of *albocristatus*. Of the sub-species I consider *ripponi* and *cuvieri* to be rather weak, whilst of *beli*, *annamensis* and *edwardsi* two may have to be suppressed when more material is available.

Mr. E. W. Oates, who was responsible for the naming of the greater number of Silver and Kalij Pheasants which have been given

önwold, del.

G. horsfieldi.

G. linnatus.

G. nycthemerus

specific rank, admitted no less than 36 species as good, not even eliminating *jonesi*, which, as I have already shown, he named from the same skin as that which Sharpe had already named *ripponi*.

Ogilvie-Grant, in Allen's Naturalists' Library, which was published in 1895, recognizes 8 species and 3 sub-species, but at this time material for comparison was scanty and even in the British Museum there was but little to work on.

Professor Ghigi, in the article to which I have alluded, gave specific rank to 24 species, and finally Sharpe, in his "Hand-List," has only allowed 16. The Hand-List, however, was also published as far back as 1899.

Key to Species.

A. Crest white ... ... *albocristatus.*
B. Crest black.
  a. Upper plumage black, feathers pale edged and rump barred, breast white ... ... *leucomelanus.*
  b. Upper plumage black without pale edges and no bars on rump; breast white ... *melanonotus.*
  c. Upper plumage black and rump broadly barred with white; breast black... ... *horsfieldi.*
  d. Upper plumage grey formed by tiny vermiculations and bars of white and black ... *lineatus.*
  e. Upper plumage almost white with sparse narrow bars of black.
    a^1. Tail with narrow bars of black; side feathers of upper breast streaked with white ... ... *nycthemerus.*
    b^1. Tail with broad bands of black; side feathers of upper breast pure white ... *whiteheadi.*
  f. Scapulars crimson bronze ... ... *swinhoii.*

Key to Sub-species of *Horsfieldi*.

A. Upper plumage glossy black, rump boldly barred black and white contrasting strongly with back ... ... *horsfieldi.*
B. Upper plumage with very fine vermiculations of white, but rump with bold bars contrasting strongly with back ... ... *cuvieri.*
C. Upper plumage finely barred with black and white, giving a general grey appearance, rump barred black and white and contrasting distinctly but not strongly with back ... . *williamsi.*

KEY TO SUB-SPECIES OF *Lineatus*.

A. Upper plumage vermiculated equally throughout with fine black and white bars. *lineatus.*

B. Upper plumage vermiculated with fine black and white bars but rump showing traces of broad bars and contrasting with back... *oatesi.*

C. Upper plumage narrowly barred or lined throughout with white and black, no contrast between rump and back ... *sharpei.*

KEY TO SUB-SPECIES OF *Nycthemerus*.

A. Sides of neck pure white.

a^1. Upper parts almost pure white with very fine and sparse lines of black. A very long tail ... ... *nycthemerus.*

b^1. Upper parts rather more marked with black; tail equally long in most cases ... ... *ripponi.*

B. Sides of neck finely vermiculated with black.

c^1. Upper parts more boldly marked with black and white, but the white still preponderating. Feathers at side of upper breast sometimes streaked with white but never pure white ... ... *rufipes.*

d^1. Upper parts still more boldly marked with black and white bars in about equal proportions; feathers at sides of upper breast white or nearly so.

a^2. Paler ... ... *annamensis.*

b^2. Darker ... ... *beli.*

? *edwardsi.*

GENNÆUS ALBOCRISTATUS.

The White-crested Kalij.

Phasianus albocristatus, Vigors, P. Z. S. (1830), p. 9; Gould, Cent. B. Himalaya, pls. 66-67 (text) (1832).

Phasianus hamiltonii, Gray, in Griffith, ed. Cuvier, iii., p. 27 (1829); *id.* Ill. Ind. Zool., i, pl. 41 (1830).

Euplocomus albocristatus, Hutton, J. As. Soc. Beng., xvii. pt. 2, p. 693 (1848); Blyth, Cat. Mus. Asiat. Soc., p. 244 (1849).

Euplocamus albocristatus, Adams, P. Z. S. (1858), p. 499; Elliot, Monog. Phas., ii, pl. 18 (1872); Hume and Inglis, Str. Feath., v, p. 42 (1877); Hume, Str. Feath., vii, p. 429 (1878); Hume and Marshall, Game B., i, p. 177, pl. (1878).

Euplocamus albicristatus, Oates, ed. Hume's Nests and Eggs, iii, p. 413 (1890).

Gallophasis albocristatus, Mitch., P. Z. S. (1858), p. 544, pls. 148, fig. 1 and 149, fig. 3; Jerdon, Birds Ind., iii, p. 532 (1863); Hume, Nests and Eggs, Ind. B., p. 526 (1873); Marshall, Birds' Nests Ind., p. 58 (1877).

Gennæus albocristatus, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 298 (1893), id. Hand-List, Game B., i., p. 258 (1895).

Gennæus albicristatus, Oates, Man., Game B., i, p. 324 (1898); Blanf., Fauna. Brit. Ind., iv, p. 89 (1898); Oates, Cat. Eggs, B. M., i, p. 54 (1901); Rattray, J. Bomb. N. H. Soc., xvi, p. 663 (1905); Ghigi, Mem. Acad., Bologna (6), v, p. 145 (1908); Macgrath, J. Bomb. N. H. Soc., xviii, p. 298 (1908); "Pine Martin," J. Bomb. N. H. Soc., xix, p. 796 (1910).

Type.—In Indian Museum.

Description, adult male.—Crest white; head and upper parts black, upper back with white shafts and narrow pale edges; lower back, rump and upper tail coverts with white bars; lower parts brown, almost white on the long lanceolate feathers of the breast. Legs pale horny.

Adult female.—General plumage reddish brown, paler below; very faintly vermiculated throughout with blackish. Central tail feathers generally rufous or rufous brown with fine pale vermiculations, other rectrices almost black.

Distribution.—Along the Himalayas, from the Indus on the West to Nepal on the East, possibly entering it for a short way in the extreme East as far as the Gogra.

During the breeding season, this Pheasant is often found at great heights up to 10,000 feet, well into a comparatively dry, cold climate with light forest and much open country. To this doubtless is due the extent of white obtaining on the upper plumage. In winter it is found between two and five thousand feet.

Gennæus leucomelanus.

The Nepal Kalij Pheasant.

Phasianus leucomelanos, Lath, Ind. Orn., ii, p. 633 (1790).

Euplocomus leucomelas, Hodgs., in Gray's Zool. Misc., p. 85 (1844).

Gallophasis leucomelanos, Gray, Gen. B., iii. p. 498 (1845); Hutton, J. A. S. B., xvii, pt. 2, p. 694 (1848).

Euplocamus leucomelanus, Hume, Str. Feath., vii, pp. 428-429 (1878); Hume and Marshall, Game B. Ind., i., p. 185, pl. (1878).

Gallophasis leucomelanus, Scully, Str. Feath., viii., p. 345 (1879).

Gennæus leucomelanus, Ogilvie-Grant, Cat. Birds, B. M., xxii,

p. 300 (1893); id. Hand-List, Game B., i, p. 262 (1895); Oates, Man., Game B., i, p. 329 (1898); Blanf., Fauna. Brit. Ind., iv, p. 90 (1898).

Gennæus leucomelanos, Ghigi, Mem. Acad. Bologna (6), v, p. 145 (1908).

Description: *adult male.*—Similar to the White-crested Kalij but having the crest black and the white on the upper parts less in extent and less conspicuous.

Female.—Cannot be distinguished from that of *albocristatus*.

Distribution.—Nepal, from the foot of the hills up to about 6,000 feet, ascending as high as 9,000 feet.

This bird is exactly intermediate between *albocristatus* and *melanonotus*, approaching the former more nearly than the latter, for, in birds from the extreme West of its range, the crest will often be found to be brownish, and the extent of white more than normal, and again *albocristatus* in the East of that bird's range, instead of having the crest pure white, sometimes has it a pale brown. Some naturalists might, therefore, consider it a sub-species of that bird, but taking into consideration the great extent of country over which the colouration is quite constant, I retain it for the present as a species.

Gennæus melanonotus.

The Black-backed Kalij Pheasant.

Phasianus muthura, Gray in Griffith's ed. Cuv., iii, p. 27 (1829).

Gallophasis muthura, Gray, Gen. B., iii, p. 498 (1845).

Euplocomus melanonotus (Blyth), Hutton, J. A. S. B., xvii, pt. 2, p. 694 (1848) (Darjeeling); Blyth, Cat. Mus. As. Soc., p. 244 (1849).

Gallophasis melanonotus, Mitchell, P. Z. S. (1858), p. 544, pl. 149, fig. 2; Jerdon, B. Ind., iii, p. 534 (1863); Hume, Nests and Eggs, Ind. B., p. 527 (1873); Marshall, B. Nests Ind., p. 59 (1877).

Euplocamus melanonotus, Hume and Inglis, Str. F., v, p. 42 (1877).

Euplocamus melanonotus, Hume, Str. Feath., vii, p. 429 (1878).

Euplocomus melanonotus, Hume and Marshall, Game Birds, India, i, p. 191 (1878); Oates, ed. Hume, Nests and Eggs, iii, p. 415 (1890).

Gennæus muthura, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 301 (1893); Ghigi, Mem. Acad. Bologna (6) v, p. 145 (1908).

Gennæus melanonotus, Ogilvie-Grant, Hand-List, Game B., i, p. 263 (1895); Oates, Man. Game Birds, i, p. 331 (1898); Blanf., Fauna. Brit. Ind., iv, p. 91 (1898); Oates, Cat. Eggs, B. M., i, p. 54 (1901).

Description: *adult male*, The whole upper plumage glossy black, the feathers with white shafts.

The Female.—Similar to that of *leucomelanus* and *albocristatus*.

Distribution.—From the extreme West of Sikkim and over the greater part of Western Bhutan. Generally speaking, it is not a bird of the highest elevations, being found between 1,000 and 4,000 feet, but ascends commonly up to 6,000, and sometimes as high as 9,000 feet. In the cold weather months it may be found occasionally as low down as the foot of the hills where the broken ground meets the plains.

Gennæus horsfieldi.

The Black-breasted Kalij Pheasant.

♂ Plate i, No. 1; ♀ Plate iii, No. 1.

Gallophasis horsfieldii, Gray, Gen. B., iii, p. 498, pl. cxxvi (1845).

Euplocomus horsfieldi, Blyth, Cat. Mus. Asiat. Soc., p. 244 (1849).

Euplocamus horsfieldi, Hume and Inglis, Str. Feath. v, p. 42 (1877); Hume and Marshall, Game B. Ind., i, p. 198, pl. (1878); Fasson, Str. Feath., ix, pp. 203-205 (1880); Hume, Str. Feath., xi, p. 303 (1888); Oates, ed. Hume's Nests and Eggs, iii, p. 416 (1890).

Euplocomus cuvieri, Hume and Marshall, Game B. Ind., i, pl. only (1878).

Euplocomus horsefieldi, Hume, Str. Feath., vii, p. 429 (1878).

Gennæus mearsi, Oates, Ann. Mag. N. H. (8) v, p. 164 (1910).

Gennæus prendergasti, Oates, J. B. N. H. S., xvii, p. 10 (1906); Ghigi, Mem. Acad. Bologna (6) v, p. 144 (1908).

Gennæus batemani, Oates, J. B. N. H. S., xvii, p. 11 (1906); Ghigi, Mem. Acad. Bologna (6) v, p. 145 (1908); Harington, J. Bomb. N. H. Soc., xx, p. 377 (1910).

Gennæus horsfieldi, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 302 (1893); id. Hand-List, Game B., i, p. 269 (1895); Blanford, Fauna. Brit. Ind., iv, p. 92 (1898); Oates, Man. Game B., i, p. 334 (1898); id. Ibis (1903) p. 102; Oates, Cat. Eggs, B. M., i, p. 55 (1901); Stuart Baker, J. Bomb. Nat. Hist. Soc., xvii, p. 971 (1907); Ghigi, Mem. Acad. Bologna (6) v, p. 144 (1908); Harington, J. Bomb. Nat. Hist. Soc., xix, p. 309 (1909).

Description: adult male.—A black bird with the feathers of the lower back barred and edged with white. In a few individuals there are faint, yet quite distinct, signs of white fringes to the feathers of the mantle, and in others, though this is most unusual, there are indications of this fringe on the innermost tertiaries and their coverts. The width of the white fringes to the rump varies greatly in individuals from the same brood, as does the extent to which these bars extend up the lower back.

In young males of the second year, a certain amount of brown vermiculation is often found on the tail feathers, and on the outermost primaries. Generally also, the gloss on the plumage appears to

be more green, or even purple, in very old males, and more blue in the younger birds. Some young males of this and other species of the family retain a brown or rufous tint on the white portions of the feathers in their first spring moult (*vide* Oates' type specimen of *williamsi*).

Adult female.—The upper plumage varies from a pure olive brown to a rich chestnut brown, the feathers with pale edgings. In some cases these pale borders are very pronounced, and in a few they are a very pale buff or practically white on the scapulars, tertiaries, and greater wing coverts. Below, the breast varies from a dull grey brown, with paler and more grey margins to the feathers, to a rich bright rufous brown, with strongly marked paler borders.

The tails vary considerably; in some specimens the two central tail feathers, in others four, and in a few six, are chestnut or chestnut mottled with brown. A few specimens in the British Museum marked ♀, but in all probability really ♂, have the under plumage much darker, almost a blackish brown, with pronounced shaft stripes, which occasionally become V-shaped. The variations recorded do not depend in the least upon locality; birds both ♂ and ♀ from the one district, Balisera in Sylhet, show the greatest divergence, so great indeed that from this one small area, a cluster of tea gardens, Oates has named no less than four species, *i.e.*, *horsfieldi, obscurus, wickhami, prendergasti.*

Distribution.—The area shown as inhabited by this bird is coloured green in Map No. 1, and may, roughly speaking, be said to extend from the East of Bhutan down the Cachar, Sylhet, Chittagong and Arakan sub-maritime and lower hill regions as far South as Akyab. It then extends East through Assam, N. and S. of the Brahmapootra, as far as the 99° long., and is found in the larger river valleys, extending considerably South into areas, the higher parts of which are inhabited by other species or sub-species. Down the Manipur River, it has been obtained as far South as Falam, on the Chindwin down to its junction with the Yu River, and probably still further down stream. On the Irrawaddy typical specimens have certainly been got as far South as Sinkan below Bhamo, and there is also a doubtful record from Zowchaun.

It is probably found in the valleys of the Upper Chindwin and Oyu, as there is a specimen in the B. M. from Tazone to the N. of these valleys which Oates himself admits is a pure *horsfieldi*.

The following types and other specimens in the British Museum Collection ticketed under other names are all *horsfieldi*.

Gennæus mearsi.—Type of species ♂ No. 73, Oates' Coll. Nanywa. This is a young bird but is a quite typical *horsfieldi*; the alleged difference, the blue shown on the feathers of the rump, is one of age and condition only, and Oates' type of *mearsi* is exactly like specimen No. 89.5.13.580 of the B. M. Coll. from the Khasia Hills and other specimens from Bhutan.

♂ No. 22, Oates' Coll., Cachar. A quite typical *horsfieldi* from Cachar; the tail is a long one, and the central rectrices are slightly vermiculated, a not uncommon occurrence in young birds.

Gennæus batemani.

♂ Oates' Coll. No. 101, Myitkina, *type*.
♀ Oates' Coll. No. 91, Myitkina.
♂ 2, Oates' Coll. Nos. 36 and 110, Myitkina.
♂ No. 149 is also a true *horsfieldi*.

Gennæus prendergasti.

♂ Oates' Coll. No. 158, Paletwa, Arakan, *type*. A young but quite typical specimen of *horsfieldi*. The rump feathers in this specimen are fringed with rufous instead of white, but I have seen this same character in young birds throughout Assam.

♂ ♂ Nos. 75, 76, 77, Oates' Coll. Balisera, South Sylhet.
No. 166, Akyab, N.-W. Arakan.
Nos. 160-1, N.-W. Arakan.

Curiously enough, although Oates calls all these *prendergasti*, none of them have his alleged distinguishing characteristic of a rufous fringed rump.

Gennæus davisoni.

♂ Nos. 63 and 67, Oates Coll. Kamaing near Nanywa.
No. 96 has a tail longer than the average, but exactly equal to Oates' No. 22, which he calls *mearsi*, and I have myself shot birds with even longer tails in Cachar.

♀ No. 97, Oates' Coll. Sinkan, Bhamo. This is a typical young male *horsfieldi*.

Gennæus wickhami.

♂ No. 82, Oates' Coll., Balisera, South Sylhet.
♂ Nos. 81, 90; ♀ 84, 88, near Fort White.
♂ No. 28; ♀ No. 31, Cachar.

Gennæus obscurus.

♂ Nos. 64, 66, 68, 70, 74; ♀ 71, Oates' Coll., Kamaing.
♀ No. 72, Oates' Coll., Jade Mines (Kamaing).

All these are quite typical *horsfieldi*. The differences alleged by Oates to exist between the females of this species and *horsfieldi* are non-existent, and the type of his ♀ *obscurus* is, almost feather for feather, exactly the same as a female from Margherita in Assam. It is a common occurrence for the female of *horsfieldi* to have from 2 to 6 of the central rectrices rufescent.

Gennæus cliffordi.

♂ No. 146, Oates' Coll., Myitkina.
♀ Oates' Coll., type ♂ 1910.7.5.102(♀ 107). This appears to be a young male *horsfieldi*.

Gennæus lineatus.

♂ Mus. Coll., No. 80.1.1.3330, Arakan.

The following specimens, which have been accorded specific names, are all hybrids :—

Gennæus batemani = *horsfieldi* ≻ *rufipes*.

♂ B. M., No. 1902.11.9.8. Shot by Captain Nisbett near Sadon. Almost a pure *horsfieldi*, but showing by the white stippling on the outer scapulars that it has a cross of *rufipes* in it.

♂ No. 103, Oates' Coll., Myitkina = $\frac{williamsi}{horsfieldi}$ ≻ *rufipes*.

Gennæus wickhami = *horsfieldi* × *cuvieri*.

♂ Oates' Coll., No. 1910.7.5.74. Falam, near Fort White, *type*.
♂ Oates' Coll., No. 78, 15 miles N.-W. of Fort White.

Gennæus cliffordi = horsfieldi × williamsi.
♂ Oates' Coll., No. ? Myitkina.

Gennæus davisoni = horsfieldi × williamsi.
♂ B. M., No. 76.4.7.155 type.

In addition to the above, there are the below mentioned hybrids in the B. M. not named:—

= horsfieldi ⊱ rufipes.
No. 1902.11.9.8. Shot by Captain Nisbett near Sadon.
No. 1902.11.9.9. Do. do. do.
No. 1905.1.25.244. Do. do. do.
No. 1905.1.25.245. Do. do. do.
No. 1905.1.25.246. Do. do. Punkhan.

=horsfieldi × rufipes.
No. 1902.11.9.9. Shot by Captain Nisbett near Sadon.
No. 1905.1.25.247. Do. do. Punkhan.

Gennæus ommaneyi=horsfieldi ⊱ rufipes.
Oates' Coll., No. 102, Myitkina, near Sadon, killed by Captain Clifford in the same place as three other specimens said to be of this species.
No. 92, Oates' Coll., No. 1910.7.5.102.
No. 100, Oates' Coll., No. 1910.7.5.105.
No. 52, Oates' Coll. Shot by Major Evans.

All these birds shot in exactly the same place vary very considerably from one another, and all show distinctly that they are hybrids. At this point, Myitkina, where the habitats of *rufipes* and *horsfieldi* adjoin, the hybridization which occurs has some very startling results.

Gennæus horsfieldi cuvieri.

Cuvier's Kalij Pheasant.

♂ Plate ii, No. 1.

Lophophorus cuvieri, Temm. Pl. Col., v, pl. 10 (1820).

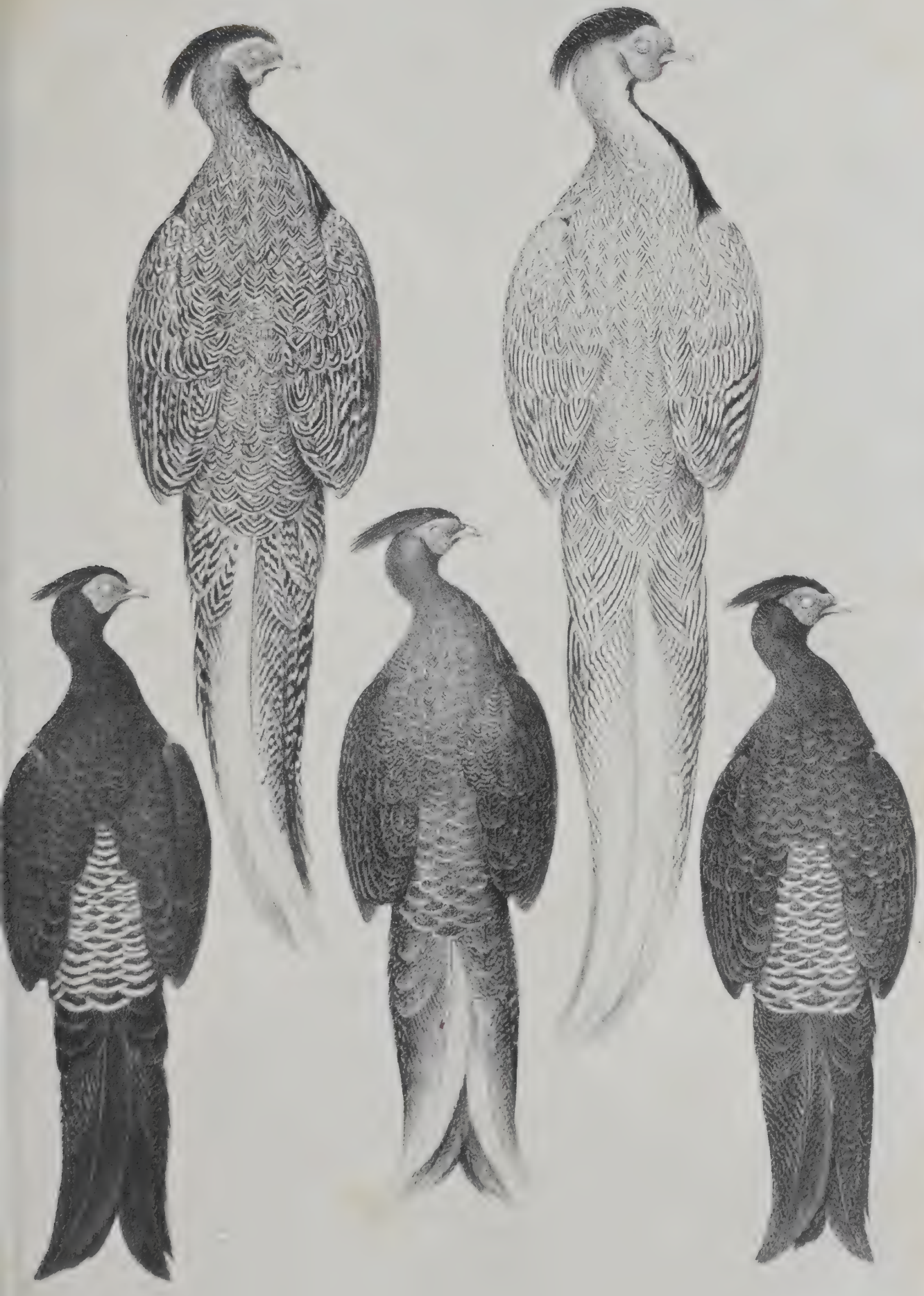
Euplocomus cuvieri, Sanderson, Str. Feath., viii, p. 493 (1879).

Euplocamus cuvieri, Hume and Marshall, Game B. Ind., i, p. 202 (1878); Oates, Str. Feath., iii, p. 343 (1875); Oates, B. Bumah, ii, p. 318 (1883) (part).

Euplocamus lineatus, Blyth, Cat. Mus. As. Soc., p. 244 (1849) (pa).

Gennæus obscurus.—Oates, Ann. Mag. Hist. (7) xiv, p. 283 (1904); Oates, J. B. N. H. S., xvi, p. 112 (1904); Ghigi, Mem. Acad. Bologna (6) v, p. 143 (1908).

Gennæus cuvieri.—Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 303 (1893); id. Hand-List, Game B., i, p. 271 (1895); Blanf., Fauna Brit. Ind, iv, p. 93 (1898); Oates, Man. Game B., i, p. 345 (1898); Oates, Ibis (1903) p. 103; Ghigi, Men. Acad. Bologna (6) v, p. 142 (1908); Hopwood, J. Bomb. N. H. Soc., xxi, p. 1214 (1912).



Sharpei. Rufipes.

Cuvieri. Oatesi. Williamsi.

Type in Indian Museum, Calcutta, No.?

Description: adult male.—This bird differs from *horsfieldi* in having numerous small white bars to the back, scapulars and wing coverts, making the general appearance of these parts a very dark grey, rather than black as in that bird. At the same time, the contrast between the broad white bars of the rump and the rest of the upper plumage is very striking.

From *oatesi* it differs in having the white of the upper parts less prominent, it is in fact exactly intermediate between *horsfieldi* and *oatesi*, as the latter bird again is intermediate between *cuvieri* and *lineatus*.

Female.—Cannot be distinguished from that of *horsfieldi*.

Distribution.—*G. h. cuvieri* extends from a little North of Akyab in a narrow line along the lower hills of Northern Arakan up to near Falam and Fort White and West of the Manipur River about as far North as latitude 24·75°. On the East of the same River it runs North along the foot of the hills, past the South of the Logtak Lake and thence North-East to Tazone and East to Nanywa and Kamaing, and thence South again over a considerable tract of country as far South as the 24° latitude. It is with a great deal of hesitation that I have admitted this sub-species to its present rank, and it is evidently one which is still not far advanced in evolution, as throughout the area it inhabits, the number of specimens obtained which show unmistakeable signs of hybridization is very large. It is a sub-species forming the intermediate link between *h. horsfieldi* and three other sub-species. Thus, on the South-West it comes between that bird and *oatesi*, then on the West and North-West between *horsfieldi* and *williamsi*, and finally, on the North-East of its range between *horsfieldi* and *rufipes*. Throughout, however, this long, narrow stretch of country we get birds which show no signs of hybridization, and which agree perfectly with the type of bird described by Temminck, but the position of the country it inhabits, *i.e.*, low hills just above the usual habitat of *horsfieldi* and just below that of the other sub-species, is one into which incursions of other forms from above and below must be constantly occurring. We should, therefore, expect to find that even if the climatic conditions are such as to render some modification of colour probable, the confined width of country occupied would make hybridization with the adjoining forms very frequent.

The original type of *cuvieri* came from Arakan.

Oates' *obscurus*, type ♂, Oates' Coll., No. 1910. ♂ 7.5.102 appears to be nothing but *cuvieri*, and might well have been the original of Temminck's picture of this bird. The ♀ as already noted is a ♂ *horsfieldi*.

The following specimens in the British Museum have been wrongly named by Oates, and are really only *cuvieri*:—

Gennæus davisoni.
Nos. 32, Oates' Coll., Tawnglon, 20 South of Kawlin.

Gennæus obscurus.
♂ No. 1902.11.9.10. Wela, 14 miles North of Wunthu.

Gennæus prendergasti.
♂ B. M. No. 86, Oates' Coll., Tiddim.

Gennæus wickhami.
♂ ♂ Nos. 79 and 80, Oates' Coll., Fort White.

Gennæus horsfieldi williamsi.

Williams' Kalij Pheasant.

♂ Plate ii, No. 5.

Gennæus williamsi, Oates, Man. Game B., i, p. 342 (1898); Oates, Ibis (1903), p. 104; Oates, J. Bomb. N. H. Soc., xviii, p. 86 (1907); Ghigi, Mem. Acad. Bologna (6) v, p. 142 (1908).

Gennæus turneri, Finn, Jour. Asiat. Soc. Bengal, lxix, p. ii., p. 146 (1901).

Gennæus macdonaldi, Oates, Jour. Bomb. N. H. S., xvii, p 10 (1906); Ghigi, Mem. Acad. Bologna (6) v, p. 142 (1908).

Gennæus ommaneyi, Oates. ? type in B. M.

Type ♂, B. Mus., No. 197.11.30.9, Kalewa.

Description: *adult male.*—Williams' Silver Pheasant is a sub-species intermediate between *cuvieri* on the North and West and *rufipes* on the East, and is an evolution on somewhat parallel lines with that of *oatesi* which comes between *cuvieri* and *lineatus* in the South and West. In the present sub-species, however, the black and white markings of the upper plumage are distinct bars and lines rather than vermiculations, though both bars and lines may be very fine. The general aspect of the upper plumage is a grey, the black and white markings being about equal in extent. The rump and upper tail coverts contrast quite strongly with the rest of the upper plumage, the feathers here being broadly fringed with white, preceded by one broad and one less broad band of white, the rest of the bars of the feather being vermiculated. Occasionally fine bars instead of broken vermiculations extend to the base of the feather. The variations are not due to age, as birds still retaining feathers of the first plumage have these parts finely vermiculated practically throughout, whilst others have them equally barred. The crest is black. The under parts are black, showing broad white lines or striæ on the sides of the breast and flanks in varying degree.

The female cannot be invariably distinguished from that of *horsfieldi*, but is on an average paler and more rufous, more especially on the rectrices.

Distribution.—Williams' Silver Pheasant has a very well-defined range, being confined to the moderately high hills lying between the Manipur, Yaw, Oyu and Irrawaddy Rivers, and occurring, as a straggler only, as far South as latitude 21° in the Minbu District and as far North as Homalin and Tammu. It appears to be most abundant between latitudes 22° and 24° and longitudes 94° and 96°, though it also occurs in some numbers about the lower hills round Fort White. Normally it is not a bird of very high elevations, and it is exceptional to find it above 4,000, its principal haunts being from 2,000 to 3,000 feet.

The following so-called species have been so named on incorrect or insufficient ground, and must be considered synonyms of *williamsi*.

Gennæus macdonaldi=williamsi.

Type No. 123, Oates' Coll. B. M., 10.24.17.1910, described by Oates, B. N. H. Journal, vol. xvii, p. 10; shot by P. Wickham on Mount Victoria at 6,000 feet.

Although found at an unusual altitude for this sub-species, this particular specimen agrees with birds which Oates himself calls *williamsi* from Pakokku and the Lower Chindwin obtained at 2,000 feet and under. Oates' type is an exceptionally fine old bird, with enormous spurs, and the inner webs of the primaries white without mottling. This however is only a sign of full maturity, and is found similarly in specimens of *williamsi*, *cuvieri* and *horsfieldi* of equal age.

Oates' type is exactly matched by a bird which Oates himself calls *ommaneyi* from Kyouk Myoung, B. M. Coll., No. 1913.5.9.1.

Gennæus ommaneyi=williamsi.

Type B. M. Coll., 1910.10.24.16, Loungshe, Pakokku.

This bird was obtained in the extreme South of the range occupied by *williamsi*, and somewhat approaches *oatesi* in having the markings on the upper back very fine and narrow. It might possibly be considered by some a hybrid between these two sub-species, but taking into consideration the great variation in the width of the marking on the upper plumage of *williamsi*, I prefer to keep it as a synonym of this bird. It is well matched by other specimens from Monywa and Kalewa in the centre of the area inhabited by this Pheasant.

♂ B. M. Coll., No. 1913·5·9·1.

Gennæus lineatus.

The Burmese Silver Pheasant.

♂ Plate i, fig. 2; ♀ Plate iii, fig. 2.

Phasianus lineatus, Vigors, Phil. Mag. (1831), p. 147.

Gennæus lineatus, Oates, Str. Feath., v, p. 164 (1877); Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 304 (1893); id. Hand-List, Game B., i, p. 272 (1895); Blanford, Fauna Brit. Ind., iv, p. 92 (1898); Oates, Man. Game B., i, p. 351 (1898); Oates, Ibis (1903), p. 100; id. Cat. Eggs, B. M., i, p. 55, pl. vi, fig. 5 (1901); Ghigi Mem. Acad. Bologna (6) v, p. 140 (1908).

Phasianus fasciatus, McClell., Calcutta Jour., N. H., ii, p. 146, pl. iii (1842).

Gallophasis lineatus, Hume, Str. Feath., ii, p. 482 (1874).

Euplocomus lineatus, Blyth, Cat. Mus. As. Soc., p. 244 (1849) (part).

Euplocamus lineatus, Hume, Nests and Eggs, Ind. B., p. 525 (1873); Hume, Str. Feath., iii, p. 165 (1875); Fielden, Str. Feath., iii, p. 168 (1875); Hume and Marshall, Game Birds Ind., p. 205, pl. (1878); Hume and Davison, Str. Feath., vi, p. 436 (1878); Anderson, Zool. W. Yunnan, ii, p. 669 (1878); Bingham, Str. Feath., ix, p. 195 (1880); Oates, Str. Feath., x, p. 236 (1882); Oates, Birds, Burmah, ii, p. 316 (1883); Oates, ed. Hume, Nests and Eggs, iii, p. 416 (1890).

Lophophorus cuvieri, Hume, Str. Feath., iii, p. 166 (1875).

Nycthemerus lineatus, Blyth and Walden, Cat. Mammals and Birds, Burmah, p. 149 (1895).

Euplocamus cuvieri, Oates, B. Burmah, ii, p. 318 (1883) (part).

Type?

Description: *adult male*.—The whole upper plumage, with the exception of a black crest, very finely vermiculated with black and white. In some birds these vermiculations are somewhat bolder and better defined than in others, but in no case do they develop into regular bars. Below the whole plumage is black with long white streaks to the feathers, widest and best defined on the flanks and sides of breast. The outer webs of the central rectrices are more or less white.

The rump is marked like the rest of the upper plumage, and *does not* contrast with it.

Adult female.—Above light olive rufous, with white and V-shaped centres to the feathers of the nape and mantle, and everywhere faintly stippled with brown; below bright rufous chestnut with broad white centres to the feathers.

The tail is pale rufescent, more or less stippled and barred with black on the outer webs of the feathers, the outer tail feathers are generally a rather rich dark chestnut barred with white, the white bars margined above and below with blackish. Sometimes the chestnut is pale and yellowish, and the richness in colour generally varies greatly individually.

Distribution.—The Burmese Silver Pheasant is found throughout the Pegu Yomas between the Irrawaddy and the Sittang, and across the extreme South of the latter River, East into the Moulmein District, as far South as Moulmein and Muleyit Mountain. Northwards it is found at least as far as the Thazi-Taungyi Road and from Fort Stedman it appears to extend in a narrow line as far East as the neighbourhood of Kengtung. It has not however been procured between Fort Stedman and Kengtung, and its appearance

at this latter place may prove to be abnormal. It appears to be found up to and sometimes above 5,000 feet. but its usual habitat would appear to be somewhere between 2,500 and 4,000 feet.

There is a specimen in the British Museum received from the Hon. the East India Company's Collection, labelled "Bhutan Himalayas" ♂ No. 44.9.4.3. This of course is an incorrectly given locality.

The following birds also appear to be wrongly labelled :—

♂ No. 67.6.13.2, Arakan, Zoological Society's Coll.

♂ No. 67.12.12.1, no data, probably same as above.

Gennæus lineatus oatesi.

The Arakan Silver Pheasant.

♂ Plate i, fig. 3.

Gennæus oatesi, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 306 (1893) ; id. Hand-List, Game B., i, p. 277 (1895).

Gennæus oatesi, Oates, Man., Game B., i, p. 348 (1898) ; Oates, Ibis (1903) p. 103 ; Ghigi, Mem. Acad. Bologna (6) v, p. 141 (1908).

Types ♂ B. M. Coll. 82.1.20.70, Arakan lat. 19, January 1872, and ♀ B. M. Coll. 1.1.35.79, Arakan, 1880.

Description : adult male.—Intermediate between *Gennæus horsfieldi curvieri* and *Gennæus lineatus lineatus*, nearer perhaps to the latter than the former. The markings on the upper plumage are very fine and give the same unicolored appearance as is seen in true *lineatus* at a distance, but when seen close by, the vermiculations are found to be bolder and more defined. There is still sufficient indication of the barring on the rump to make this part of the upper plumage contrast with the rest, and in one specimen from Thazi-Taungyi the barring is quite strongly developed. The flanks and sides of the breast and lower neck have broad white shaft lines, and the central rectrices are broadly white on the outer web.

The female.—Differs from that of *horsfieldi* and *curvieri* in having the whole tail above and below irregularly barred with pale dull rufous. Of the three specimens in the B. M. Coll., two have the rectrices a dull pale chestnut brown, and the third has them a chestnut rufous. In each case the central rectrices are somewhat paler and more rufous than the rest, but not sufficiently so to cause a contrast as occurs in *horsfieldi* in similar cases. The type female has no pale striæ on the upper parts, but is redder than most female *horsfieldi*, the others have these tiny central striæ to the feathers, but are otherwise more like normal females of that bird. All have pale central striæ to the feathers of the neck, breast and upper flanks, similar to, though less pronounced than in the females of *lineatus*.

Distribution.—Oates' Silver Pheasant inhabits an area of low hills in Arakan from the sea coast to the Irrawaddy River as far North as Minbu, but does not apparently ascend the hills to any great elevation, and though stragglers may be found up to 5,000 feet, it keeps normally to between 1,000 and 3,000 feet. In the extreme South of Arakan it is very rare, and does not come down near the sea coast except when the hills also come right down to this. There are very few skins of this sub-species in collections, and it is therefore difficult to define its area. In the dry zone of Arakan there are no Pheasants, and this may, with some differences which exist in the country North and South of Minbu, account for the constant difference in type between *williamsi* and *oatesi*.

The only five specimens named *oatesi* in the British Museum Collection are all from the area restricted to this sub-species, and are all correctly named.

Gennæus lineatus sharpei.

Grant's Silver Pheasant.

♀ Plate iii, No. 3.

Gennæus sharpei.—Oates, Man. Game B., i, p. 357 (1898); Oates, Ibis (1903) p. 101; Ghigi, Mem. Acad. Bologna (6) v, p. 140 (1908).

Type ♂, B. Mus., No. 189.5.10.1703, Dargwin.

Description: *adult male.*—This sub-species is nearer to *lineatus* than to any other, but it is also the first of the Northern forms to show the transformation of the vermiculations into bold lines of black and white, quite different in character from the duller toned barring of the Western forms. The whole upper plumage is barred, or perhaps one should say lined, throughout with black and white, the lines much about the same in width, but the black, if anything, predominating, some birds looking very dark. The black under parts are very freely marked with white in bold longitudinal streaks on breast and flanks, especially on the sides of the upper breast, far more so even than any of the whiter forms in the North, and showing a distinct approach to the Annam birds which again run into the Hainan *whiteheadi* which has the feathers here pure white.

Adult female.—Similar to that of *lineatus* but at once easily distinguished by having the lower parts a smoky blackish brown instead of bright chestnut brown; the feathers are however streaked with white throughout as in that species.

The tail is more like that of the female of *rufipes*, with very bold, richly marked outer tail feathers, though the central rectrices are like those of *lineatus*.

The only three specimens of females in the British Museum Collection were all collected on Muleyit Mountain, whence no male bird had yet been obtained, and I was extremely doubtful as to accepting them as proved females of the male bird which Oates called *sharpei*. I have now, however, a pair of birds which I owe to Mr. J. P. Cook, shot together, so that I have no longer any hesitation in giving *sharpei* sub-specific rank. Except for the bold white marking on the flanks, the male *sharpei* is very like the darkest specimens of *rufipes* which Oates named *atlayi*, but it is darker still than these birds with narrower bars on the upper plumage and wings.

Distribution.—The type was obtained from Dargwin at an elevation of some 2,500 feet, and it has also been procured at Thandoung and Papun. The three females were taken in Muleyit about 3,500 feet, and the pair of birds sent me were shot near Rahang, N.-E. of Muleyit.

Its range is probably the Salwin Valley from about the 17° of latitude as far North as Karennee, and it will also probably be found to extend West and East to the Sittang and Me Wung Rivers, respectively, in so far as the country suits it. Its stronghold, however, will probably be found to be the higher ranges of the Bree Country in the North and Muleyit in the South.

It is difficult to advance any theory as to why the duller vermiculated upper surface of the plumage of the Western forms should here be in gradual course of transformation to bolder lines of black and white, but it is possible that such a colouration is more protective in open sunlit country than it would be in the soft grey shades of thin forest.

Gennæus nycthemerus.

The Chinese Silver Pheasant.

♂ Plate i, fig. 3; ♀ Plate iii, fig. 6.

Phasianus nycthemerus.—Linn, S. N., i, p. 272 (1768); Lath, Ind. Orn:, ii, p. 631 (1790).

Euplocamus nycthemerus.—J. E. Gray, Ill. Ind. Zool., ii, pl. 38, fig. 2 (1834); Blyth, Cat. Mus. As. Soc., p. 244 (1849).

Euplocamus nycthemerus.—Gould, B. Asia, vii, p. 17 (1859).

Gennæus nycthemerus.—Ogilvie-Grant, Cat. Birds, B. M., xxii, p 307 (1893); id. Hand-List, Game B., i, p. 277 (1895); Oates, Cat. Eggs, B. M., i, p. 55 (1901); Ghigi, Mem. Acad. Bologna (6) v, p. 138 (1908); Ingram, Nov. Zool., xix, p. 270 (1912).

Type ?

Description: adult male.—The upper plumage white with narrow longitudinal lines of black, finest and very often broken on the neck and back, and broadest, though still much narrower than the white, on the wings and outer tail coverts and tail feathers; two, and

sometimes four, central tail feathers pure white and greatly lengthened ; sides of neck pure white, the frecklings often absent even on the nape just behind the crest. Below black, the feathers of the sides of the breast barred, or lined, black and white.

The number of bars and even their alignment varies in almost every individual, and this species shows well how utterly useless was Oates' attempt to divide species of Silver Pheasants according to the number and alignment of the markings on the wing feathers.

Adult female.—Upper parts olive brown with the crest somewhat darker. While lower surface varying between olive grey-brown to pure grey-brown, the greater part of abdomen and flanks and under tail coverts powdered with minute white specks, rather larger and more definite on the under tail coverts than elsewhere.

Tail very long as in *ripponi*. Legs red.

Distribution.—" South China, Fokien, Chinkiang " (Grant). The Chinese Silver Pheasant appears to be found from latitude 28° to about latitude 22° on the Western watershed of the Salwin, but not in the lower lying country adjoining the river between 22° and 24°.

Gennæus nycthemerus rufipes.

The Ruby Mines Silver Pheasant.

♂ Plate ii, fig. 4; ♀ Plate iii, fig. 4.

Gennœus rufipes, Oates, Man. Game B., i, p. 362 (1898); Oates, Ibis (1903) p. 97 ; Ghigi, Mem. Acad. Bologna (6) v, p. 139 (1908).

Gennœus atlayi, Oates, Ann. and Mag. Nat. Hist. (8) v, p. 162 (1910).

Gennœus granti, Oates, Ann. and Mag. Nat. Hist. (8) v, p. 163 (1910).

Gennœus assimilis, Oates, Journ. Bomb. N. H. Soc., xvi, p. 114 (1904); Oates, Ann. and Mag. Nat. Hist. (7) xiv, p. 286 (1904); Ghigi, Mem. Acad. Bologna (6) v, p. 141 (1908).

Gennœus elegans.

Gennœus affinis, Oates. Ann. and Mag. Nat. Hist. (7) xi, p. 231 (1903); Ghigi, Mem. Acad. Bologna (6) v, p. 143 (1908).

Type ♂, B. Mus., No. 96.1.15.1, Mogok, near Ruby Mines.

Description : *adult male.*—Whole upper plumage barred black and white, the latter greatly preponderating, so that the general impression given by the bird at a distance is that it is nearly white above and black below. Legs red.

Female.—General colour above rich olive brown, crest darker and tail very richly barred and mottled with deep chestnut and blackish brown, the outer tail feathers darker than the central ones. Under

Feathers from the breasts of females of

1. *Gennaeus horsfieldi.*
2. *G. lineatus.*
3. *G. sharpei.*
4. *G. nycthemerus rufipes.*
5. *G. swinhoei.*
6. *G. n. nycthemerus.*

parts rich blackish brown, the feathers marked with bold concentric bars of rich fulvous, not with longitudinal striæ as in *lineatus*. Legs red.

Distribution.—The area inhabited by this sub-species may be said to be the inter Irrawaddy-Salwin District from about 26·50° latitude N. to about 21·50° or rather further South.

It will be seen that the area occupied by this sub-species is very much greater than that inhabited by any other, but, at the same time, it is a well-defined area between two big rivers, the Irrawaddy and the Salwin, on the West and East; whilst on the South it is to a great extent divided from *sharpei* by the dry area from Mandalay and Maymyo on the North to Meiktila and Taungyi on the South, in which Silver Pheasants appear to be very rare.

The extent to which *rufipes* must be held to absorb other species named by Oates and others is a question which has given me infinitely more need for thought than the consideration of the whole of the other forms put together. In the area which I now claim holds but one good and one doubtful sub-species, Oates and others have named the following thirteen species:—*G. rufipes*, *jonesi*, *ripponi*, *atlayi*, *assimilis*, *elegans*, *granti*, *affinis*, *haringtoni*, *andersoni*, *nisbetti*, *crawfurdi* and *nycthemerus*.

At first sight, this would seem to show that I must be wrong in admitting but two sub-species, but a careful analysis of the position will possibly prove my contention to be right. In the first place a glance of the Map No. 2 will show that throughout the wide area over which this bird, *rufipes*, is distributed, there is no very large river to check distribution, and with the other sub-species we find that, almost invariably, rivers form the boundaries which divide one from another. It is true that along the valleys of some of these boundary rivers another species, *horsfieldi*, is to be found at the lowest altitudes, but still we have a definite boundary to the hills which prevents access, except in exceptional cases, from one area to another. But in the area occupied by *rufipes*, there is no crossing of such boundary, and therefore there is only one other cause which would check the spread of a species, or sub-species, *viz.*, a sudden alteration in the elevation of the country and a corresponding change in climate and vegetation. There is, however, no change of this character in elevation, and the bird spreads accordingly. At the same time, the South centre of the area marked on the map as being the habitat of this bird is much drier and lower, and here, accordingly, the bird has not yet been obtained.

An examination of all the material obtainable proves that even in the area occupied by *rufipes*, the same laws that have in other parts of Burmah evolved species and sub-species are in force here also, in consequence of which we find that, *on an average*, the whitest birds are to be found on the highest, most open plateaux and

mountains on the extreme North-East and East, and the darkest on the more heavily forested, damper and lower mountains on the South-West.

The variation in elevation and climate is, however, not nearly so great between these two extremes as it is in most parts of this country, so the parallel differences in plumage are also less well-defined. Again, when one sorts out specimens according to locality, it is found to be impossible to define to which sub-species any one locality shall be allotted, and the more specimens one obtains, the more difficult is it to name them.

For instance, there is the Ruby Mines District from which we have no less than six so-called species, *i.e.*, *rufipes*, *atlayi*, *assimilis*, *elegans*, *haringtoni* and *nisbetti*. Again, we can narrow down some of these species in many cases to yet smaller areas. Thus, *rufipes* and *atlayi*, both specimens named by Oates himself, were shot by Captain Atlay on the same day at the same place, fifteen miles East of Mogok. From Mogok itself we have specimens of *rufipes*, *atlayi*, *elegans*, and *assimilis*, the same from Kyatpin and other places.

Oates has laid considerable stress on the fact that some of his species have red and some of them yellowish horn, or dull greenish horn coloured legs.

It is necessary, therefore, to examine this point carefully. Our four admitted species which bound this area have their legs coloured, thus : *horsfieldi*, dark coloured legs with no tinge of red, a colour which is retained in the legs of its sub-species *williamsi* and *cuvieri*. *Lineatus* also has dark legs, as has its sub-species *oatesi*, but when we examine the sub-species *lineatus sharpei*, we find that though it has not red legs its legs are described by field naturalists as yellowish horn or light horn. Thus it would appear as if some climatic influence were already at work turning the colour of the legs to a lighter and brighter hue. The two species *whiteheadi* and *nycthemerus* both have brilliant red legs, and, as we should expect, the sub-species nearest to them, *rufipes*, *beli* and *annamensis* have also red legs.

Why then should *elegans* and *massimilis* have yellow legs ? The reason I believe is merely this, that the colour is due to a throw back to the original type *horsfieldi*, or is due to direct hybridization with this bird, although the cross may not be a recent one or apparent in other ways.

Of *atlayi* there are six specimens in the British Museum Collection, all of which have yellow legs and four of which are in general colouration very dark birds. All these specimens of *atlayi* are from Mogok and Khaben, the most Western portion of the range of *rufipes*, and nearest to, and therefore most liable to hybridization with, *horsfieldi williamsi*. Moreover, Mogok is close to the valley

of the Irrawaddy, and it is quite possible that the cross may have even been with a specimen of *horsfieldi* itself.

As regards *elegans*, of the eight specimens in the Museum Collections, seven were collected in the Ruby Mines District, and one at Loimai in the Southern Shan States. In these cases the yellow legs are due to the causes already mentioned with the exception that in the case of the Loimai bird the throw back would be to *lineatus* or the cross, if due to hybridization, with the same bird.

It appears to me that Oates found within the Ruby Mines District a form of Silver Pheasant which varied very greatly in depth of colouring, birds from the same locality and sometimes from the same flock showing the extremes of variation met with. Then at the same time and from the same locality he got dark birds with red legs and pale birds with red legs, and also both forms with yellow legs. He accordingly divided the red legs from the yellow legs, and these two divisions again into dark and light birds, after which he gave them four names.

The darker red-legged birds he called *atlayi* and the paler *rufipes*, whilst of the yellow-legged birds he called the paler *elegans*, and two somewhat darker specimens *assimilis*.

A bird with one yellow and one red leg he has called *rufipes*.

It is quite incredible that four sub-species can exist in the same area at the same elevation, and I have no alternative but to reduce *assimilis*, *elegans* and *atlayi* to synonyms of *rufipes*.

Before leaving this question of variation and hybridization, it may be well to quote the remarks made by Major Nisbett in a letter to Major Harington:

> "This bird was shot at a spot near Sadon, where the two "streams meet before flowing down to the Irrawaddy, and where "I can conscientiously say I never got two birds alike."

Of the remaining so-called species, *haringtoni*, *nisbetti*, *andersoni*, *crawfurdi* and *granti*, all bear distinct signs of hybridization. *Haringtoni* and *andersoni* are exactly like one another, and both show in the unequal marking on the upper plumage that they are the result of hybridization. *Crawfurdi* is merely a synonym of *andersoni*, and *granti*, though a paler bird than *haringtoni*, shows very similar marks of the *horsfieldi* cross.

The following specimens are all *Gennæus nycthemerus rufipes*:—

Gennæus atladi.

1. B. M., No. 1910.7.5.17, Ruby Mines; type of species.
2. „ „ 1910.7.5.20, 15 M. E. of Mogok. Shot together with *rufipes*, No. 1910.7.5.5.
3. „ „ 1910.7.5.18, Ruby Mines.
4. „ „ 1910.7.5.19 „ „
5. } „ „ 1910.7.5.21-22, Khaben, Ruby Mines.
6. }

Gennæus elegans.

1. B. M., No. 1910.7.5.30, Taung-ping, Ruby Mines; type of species.
2. } „ „ „ 7.5.34-5, Kyatpin, Ruby Mines.
3. }
4. } „ „ „ 7.5.31-2, Ruby Mines.
5. }
6. „ „ „ 7.5.33, Mogok.
7. „ „ 1903.7.24.2 „
8. „ „ 1900.12.20.940, Below Loimai, S. Shan.

Gennæus assimilis.

1. } B. M., No. 1910.7.5.24-5, Ruby Mines; type of species.
2. }

The following specimens are all hybrids :—

Gennæus haringtoni=G. nycthemerus rufipes>horsfieldi. Type.

Gennæus andersoni=G. n. rufipes>horsfieldi.

This bird is exactly the same as the specimens called *haringtoni* by Oates. (Type in Indian Museum, Calcutta.)

Gennæus granti=G. n. rufipes>horsfieldi.

Types { ♂ Nisbett's No. 8 in Oates' Collection.
♀ „ „ 2 „ „ „

Both these birds were shot by Nisbett at Puntun, S.-E. of Sadon. They are the birds mentioned by Oates as being his types of the species, although he has not noted this on the labels.

All three of these so-called species, *haringtoni*, *andersoni*, and *granti* are hybrids between *rufipes* and *horsfieldi*; they vary somewhat *inter se*, but the *nycthemerus* cross is the dominating one, especially in *granti*. Hybridization is shown distinctly by the patchy colouration, and it is most interesting to note that in all these hybrids the barring of the rump in contrast to the rest of the upper plumage is distinct, though faint. In fact here in the extreme North-East of the Silver Pheasant's habitat hybridization has evolved a specimen very much like a pale *cuvieri* or dark *oatesi* in the West.

All these hybrids are red-legged birds.

Gennæus nisbetti = G. n. rufipes>horsfieldi.

Type Oates' Coll., No. 99.

This species is named from the remnants of a skin only, and it is not easy to say whether it is a specimen of *rufipes* pure and simple, or a hybrid, but traces of unevenness in the marking incline me to the latter opinion.

Gennæus lineatus, Museum No. 1900.12.12.946, shot on the Eastern frontier of Bhamo, is a hybrid between *nyctheremus rufipes>horsfieldi.*

Gennæus nycthemerus ripponi.

The Yunnan Silver Pheasant.

Gennæus ripponi, Sharpe, Bull. B. O. C., xiii, p. 29 (1902); Ghigi, Mem. Acad. Bologna (6) v, p. 139 (1908).

Gennæus jonesi, Oates, Ibis (1903) p. 97; Ghigi, Mem. Acad. Bologna (6) v, p. 139 (1908).

Description : adult male.—Differs from *nycthemerus rufipes* in being still whiter above with finer and fewer lines of black, in having the whole of the sides of the neck pure white rather than white finely vermiculated with black, and in having generally a longer tail.

Adult female.—Appears to be like that of *nycthemerus* rather than that of *rufipes*, though birds on the West and South-West of the inter Salwin-Mekong District somewhat approach the latter bird. The tail of the female is longer on an average than that of *rufipes*.

Distribution.—The district lying between the Salwin and Mekong Rivers as far South as the 20° latitude, where it meets *sharpei*.

It is only after long consideration, and, even then, with some hesitation that I accept this form as a sub-species.

The type of *ripponi* was a bird sent by Oates to Sharpe, who separated it from other forms under this name, and then returned the skin to Oates who, unaware that Sharpe had named it, again separated it as *jonesi*, so that the one skin is the type for the two species.

There is no doubt that if we make two geographical groups of the Silver Pheasants inhabiting the Irrawaddy-Salwin and the Salwin-Mekong Districts, it is easy to say that the one group differs from the other *on an average* in the respects already mentioned, but at the same time, it is equally undoubted that from the second named group one can easily pick out individuals matching *rufipes* on the one side, and again *nycthemerus* on the other. Thus a specimen—B. M., No. 97.9.2.1 — shot 20 miles East of Keng-tung is exactly like a specimen of true *nycthemerus* shot at Fokhien. I do not think that *nycthemerus rufipes* and *n. ripponi* are the same, but I feel doubtful if I am justified in dividing *ripponi* from *nycthemerus* itself.

There are nine specimens of *ripponi* in the British Museum Collection and a good series of *nycthemerus* from China and, as the average of the nine specimens of the former bear out Sharpe's diagnosis as a whole, I retain *ripponi* for the present, but if more material shows that the affinity to true *nycthemerus* is closer still, then *ripponi* must become a synonym of that bird.

The whole of the British Museum specimens, with one exception from Yunnan, have been obtained from the Southern Shan States, from Keng-tung to Moukmai, but I have seen one other specimen from the Northern Shan States and another from Yunnan which both are referable to this sub-species.

Although the range of this bird appears to run into that of *sharpei*, I have seen no specimens which appear to approach *sharpei* more closely than *rufipes* or *nycthemerus*. This may be due to *sharpei* keeping to lower levels than *ripponi*, but it certainly lends some strength to the contention that *ripponi* is entitled to rank as a sub-species.

GENNÆUS NYCTHEMERUS BELI.

Oustalet's Silver Pheasant.

Gennæus beli, Oustalet, Bull. M. Hist. Nat. Paris, iv, pp. 258-261 (1898); Ghigi, Mem. Acad. Bologna (6) v, p. 140 (1908).

Types in Paris Museum brought from Annam by Monsieur Bel.

Description: *adult male.*—Very similar to *sharpei*, but perhaps somewhat more boldly marked and with the black rather more pronounced on the wing feathers in comparison with the upper plumage. It differs principally from *sharpei* in having far more white on the feathers of the sides of the breast under the shoulders of the wing (carpal joint), in this respect showing its affinity to *G. whiteheadi whiteheadi*. The black lines on the wing are very broad and prominent.

Adult female.—Above, olive brown, practically without vermiculations and with no white markings. Tail rufous, inclining to chestnut on the outer feathers and vermiculated with narrow bars of dark brown. Below, paler olive brown with pale shafts and more rufescent under tail coverts.

Distribution.—Annam. The only specimen in the Museum is one of some birds reared in the Menagerie of the Paris Museum, the types having been brought from Annam by Monsieur Bel.

Much more material is necessary before it is possible to say whether *beli* and *annamensis* are separate from one another.

Gennæus nycthemerus annamensis.

The Annam Silver Pheasant.

Gennœus annamensis, Ogilvie-Grant, Bull. B. O. C., xix, p. 13 (1906) (Bali, Annam) ; Ghigi, Mem. Acad. Bologna (6) v, p. 139 (1908).

Description : *adult male.*—Differs from *beli* in the same way that *sharpei* differs from *rufipes* in being an altogether darker bird with narrow white and broader black bands, this being especially noticeable on the wings and tail.

Female.—Like that of *beli*.

Distribution.—Annam " Hills behind Mhartrang " (Dr. J. J. Vassal).

Gennæus whiteheadi.

Whitehead's Silver Pheasant.

Gennœus whiteheadi, Ogilvie-Grant, Ibis (1899), p. 586 (Hainan); Ghigi, Mem. Acad. Bologna (6) v, p. 138 (1908).

Types in British Museum.

Description: adult male.—Crest and whole lower parts black. Sides of neck and shoulders white, the feathers with a narrow line running round the feather, following its contour about 5mm. from the edge; this line gets broader as it gets lower down the back, whilst in the wings the feathers are finely edged with black, and have the next black band as much as 8mm. wide. Central tail

feathers white, the next pair, or two pairs, white on the outer web and barred with wide semi-longitudinal bands of black about 12mm. broad.

Adult female.—Above, bright rufous brown, blackish brown on the shoulders where the feathers are broadly centred with white; elsewhere finely vermiculated with dark brown; tail rather more chestnut, especially on outer feathers. Below, nearly white, each feather broadly margined with blackish brown; chin and throat dirty white, and centre of abdomen and vent dull grey, showing only faint signs of dark edgings.

Distribution.—Hainan.

Gennæus swinhoii.

Gould's Silver Pheasant.

Euplocamus swinhoii, Gould, P. Z. S. (1862), p. 284; Swinhoe, Ibis (1863), p. 401; Gould, B. Asia, vii, p. 16 (1864); Swinhoe, Ibis (1865), pp. 353, 538; (1866) pp. 133, 308, 404; (1867) pp. 232, 409; P. Z. S. (1871), p. 399; Elliott, Monog. Phasian., ii, p. 25 (1875).

Gennæus swinhoii.—Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 309 (1893); id. Hand-List, Game B., i, p. 278 (1895); Oates, Cat. Eggs, B. M., i, p. 56 (1901).

Description: *adult male.*—Head, with exception of short crest, neck and under parts with all but central rectrices black; short crest, back of lower neck, upper back and central tail feathers white; lower back and upper tail coverts black; fringed with brilliant deep blue glass; scapulars purple bronze; wings black, the coverts egged with metallic green.

Adult female.—A rich rufous brown above, finely barred with black and feathers of mantle with broad rufous centres bordered and barred with black; central tail feathers the same as the back with narrow bands of whitish and black. Below, chin, throat, and sides of head and neck pale dull cinereous with still paler shaft stripes; remainder of lower plumage rich fulvous brown, almost chestnut on breast, the feathers margined and marked with lines of black.

Distribution.—Formosa.

Gennæus edwardsi.

Edward's Silver Pheasant.

Gennæus edwardsi, Oustalet, Bull. Mus., Paris, ii, pp. 316-317 (1896).

Type in Paris Museum.

Description: *adult male.*—"Piles crista decumbente alba, vix nigro maculata ornato, dorso, pectore, abdomineque splendide nigro

cœruleis, tergi plumis caudaque tectricibus limbo nigro decoratis, alarum tectricibus æno-viridi colore nitentibus, limbo nigro ante apicem ornatis, cauda nigrante, fere pluna, pennis gradatis, capitis lateribus nudis, rubris, paulo carunculatis, rostro corneo, basi nigra, pedibus rubris." (Oustalet.)

I have not been able to examine this bird, the only existing specimens of which are two adults, one young male, and some fragments which are in the Paris Museum. Judging however from the description of its white crest and blue-black back, etc., it is an entirely different species to any other.

Distribution.—Kuang-tri, Annam.

The following is the synonymy of the various hybrids which have been described as species:—

Gennæus wickhami.

Gennœus wickhami, Oates, Man. Game B., ii, p. 495 (1899); Oates, Ibis (1903), p. 102; Ghigi, Men. Acad. Bologna (6) v, p. 142 (1908).

Gennæus cliffordi.

Gennœus cliffordi, Oates, Ann. Mag. Nat. Hist. (7) xiv, p. 284 (1904); Oates, Journ. B. N. H. Soc., xvi, p. 113 (1904); Ghigi, Mem. Acad. Bologna (6) v, p. 144 (1908).

Gennæus davisoni.

Gennœus davisoni, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 304 (1893); id. Hand-List, Game B., i, p. 271 (1895).

Finn, J. As. Soc. Beng. (2) lxix, pp. 145-146 (1900); Oates, Ibis (1903), p. 105; Ghigi, Mem. Acad. Bologna (6) v, p. 142 (1908).

Gennæus haringtoni.

Gennœus haringtoni, Oates, Ann. and Mag. Nat. Hist. (8), v, p. 162 (1910); Harington, J. Bomb. N. H. Soc., xx, p. 377 (1910).

Gennæus andersoni.

Eulocamus andersoni, Elliot, P. Z. S. (1871), p. 137; Anderson, Birds, Yunnan, p. 670, pl. iii (1878); Hume and Davison, Str. Feath., vi, p. 437 (1878); Hume and Marshall, Game Birds, Ind., i, pl. (1878); Anderson, Zool. W. Yunnan, ii, p. 678, pl. liii (1878); Oates, Birds, Burmah, ii, p. 319 (1883); Finn, Bull. B. O. C., viii, p. 45 (1899).

Nycthemerus andersoni, Blyth and Walden, Cat. Mamm. and Birds, Burmah, p. 149 (1875).

Gennæus andersoni, Ogilvie-Grant, Cat. Birds, B. M., xxii, p. 306 (1893); id. Hand-List, Game B., i, p. 276 (1895); Oates, Ibis. (1903) p. 95; id. Man. Game B., i, p. 337 (1898); Blanf., Fauna Brit. Ind., iv, p. 94 (1898); Ghigi, Mem. Acad. Bologna (6) v, p. 140 (1908); Ingram, Nov. Zool., xix, p. 270 (1912); Harington, J. Bomb. N. H. S., xx, p. 377 (1910).

Gennæus nisbetti.

Gennæus nisbetti, Oates, Ibis. (1903) p. 99; Ghigi, Mem. Acad. Bologna (6) v, p. 140 (1908).

Gennæus crawfurdi.

Phasianus crawfurdi, Gray, in Griff. ed. Cuv., iii, p. 27 (1829).
Euplocamus crawfurdi, Hume, Str. Feath., vi, pp. 437, 521 (1878); id. xi, p. 303 (1883).

INDIAN WOOD-DESTROYING WHITE ANTS

(SECOND CONTRIBUTION.)

BY

JOSEPH ASSMUTH, S. J.

The first paper on this subject was published in September 1913 (B. N. H. J. Vol. XXII, No. 2, pp. 372—384). Since that time I have made two more long collecting excursions—one to Chota Nagpur during October-November 1913, the other to South Canara and Mysore during April-May 1914—and several short ones to Gujerat, the Bhor Ghats, etc. They have brought to light some new facts regarding our Indian wood-eating Termites, a summary of which I publish in this paper. I have again to thank most cordially the Agents of the G. I. P., B. B. & C. I., and M. & S. M. Railways, for their liberal grant of passes without which it would have been impossible to carry on my researches. I am also under great obligations to the Chief Engineer, P. W. D., Sind, and to many members of his staff for sending me a great number of specimens of Termites as well as damaged wood. If this example of co-operation would be more generally imitated by others, our knowledge of Indian noxious White Ants would soon be much nearer completion than it is now. Lastly I beg to tender my heartfelt thanks to all the many others who have in any way assisted me in my studies, especially to the Jesuit Fathers of the Calcutta and Mangalore Missions

I propose to give in the following lines short notes first on the noxious Termites already mentioned in my preceding paper, then on some new kinds not previously recorded, and finally to add a few general observations bearing on the question of wood-destroyers.

Leucotermes indicola, *Coptotermes Heimi* (besides one or two other species of this genus), and *Odontotermes Feæ* are "the most important wood-destroyers; Termites in houses...will in a large majority of cases be found to belong to one of these kinds." So I wrote in my first article (l. c., p. 374). I have now, after my latest investigations, come to the conclusion that this statement may be more precisely and correctly expressed thus: Termites doing damage in buildings to timber or, in fact, to any wooden structure found in them, belong in all cases to one of the abovenamed kinds, and to no other. I have examined a very large number of Termite-infested habitations in the Provinces of Bombay, Bengal, Madras, Behar and Orissa, and I did not in a single instance come across any but the said three species.

These Termites are, of course, also seen feeding on all sorts of dry wood away from houses and even in forests, just like the rest of the

wood-destroyers; but if it is a matter of Termites doing damage in any kind of building they are certain, according to my experience, to belong to one of the just mentioned genera.

This showed itself most strikingly in the case of *Odontotermes Feæ* in Chota Nagpur, where this species abounds. I examined dozens of its nests in garden, field and forest, and in every case—I do not remember a single exception—I found colonies of *Microtermes* associated with it. But in buildings such a companionship was never noticed; there *Odontotermes Feæ* held the field alone in the beams of walls as well as in the rafters of roofs.

I add a few of the more important localities where I took specimens of the wood-destroyers under discussion: *Leucotermes* found in Calcutta, Mangalore, and in villages of South Canara near the range of the Western Ghats; *Coptotermes* in Calcutta, Mangalore, and Ranchi; *Odontotermes Feæ* in the lastnamed places, and also in the Ghats of South Canara up to an elevation of 3-4,000 feet.

To sum up: of the various kinds of wood-destroying Termites in India only three appear to have adapted themselves to live in buildings[1] and feed on wood contained in them; these three occur almost everywhere throughout the Peninsula. This is of special interest, because on the one hand our wood-eating species are on the whole fairly numerous, and on the other the respective Termite Faunas of Northern, Central and Southern India exhibit considerable variety.

Special mention must here be made of Sind, for I am not quite sure whether the above statement is applicable to this Province as well. Of the many specimens taken in buildings and otherwise I have received from Sind, none belonged to either *Leucotermes* or *Odontotermes Feæ*. *Coptotermes* was taken in different places, but the kind most often sent to me was *Microtermes*. It would therefore seem that the two firstnamed forms are not represented in Sind, whereas the last genus is far more often met with than in other parts of India, and has even acquired the habit of attacking timber in houses. But details are as yet too scanty to allow of any definite opinion on this head. I hope to settle the matter as soon as I get a chance of visiting Sind at some future time.

The peculiar custom of *Microtermes* of living associated with other Termites has already been mentioned. I often found *Microtermes* colonies in the mounds of *Odontotermes obesus*, in the nest area of *Odontotermes Feæ*, etc. With regard to the latter "compound nests," I came always to the conclusion—after careful examination of the feeding figures and fillings—that the attack on wood on which the Termites were seen feeding, had been started by

[1] Cp. the similar habit of the true Ants *Prenolepis longicornis* (Aitken, *Tribes on my Frontier*, p. 51; Wroughton, this Journal Vol. vii., p. 41), and *Plagiolepis longipes* (Wroughton, l. c. p. 385).

Odontotermes Feæ; *Microtermes* was a later arrival which had occupied portions of the tunnels and galleries of the "host" and was now continuing the work of destruction in company with the latter.

So far I have only once succeeded in finding—at Ranchi (No. 447 of my collection)—a colony of *Microtermes* living by itself alone, with no other kind of Termites anywhere near it. This gave me the long looked-for chance of getting exact details of the feeding figure of this White Ant; for when I discovered the nest, the workers were busily engaged upon destroying a board of dealwood lying on the ground. Almost the whole of the lower as well as portions of the upper surface of the board was covered with crusts of dark earthy material, much in the same fashion as with *Odontotermes Feæ*, except that in this case the material employed for construction was not so coarse-grained as with the latter species. After removing the earthy crust or cover, the feeding figure became clearly apparent.

As the most striking feature one should note the non-coherence of the holes eaten into the wood. One gets the impression that every individual had set to work quite independent of the rest. The result of this way of proceeding is an abundance of sporadic holes scattered irregularly all over the wood: some of them deep, some shallow, some long, some short, etc. Most of the holes are found to extend along the soft veins of the wood; a few of them however cut right across the veins, and in this case everything—hard as well as soft portions of the wood—is destroyed. I observed also tunnels constructed completely inside the wood which did not reach the surface at all; but the greater part of the feeding area was superficial.

Hence it appears that *Microtermes* when attacking wood acts in some respects like *Leucotermes* (feeding along the soft veins, and inside the wood), in others like *Odontotermes Feæ* (destroying soft as well as hard portions of wood, feeding on the surface, building covers of earthy material). But taken as a whole the feeding figure of *Microtermes* is so characteristic that it cannot easily be mistaken for another. I hope it will be possible to give a photograph of it in one of the subsequent numbers of the Journal.

In addition to the kinds spoken of in the preceding pages I came across several new wood-destroyers in different localities. It will be sufficient for the purposes of this paper to mention them but briefly. They are of minor practical interest since they do not infest houses, but are either forest dwellers or else occur so rarely that the damage they do is insignificant.

I begin with a rather remarkable wood-destroyer of the *Eutermes* tribe[1]. Colonies of this Termite were abundant in certain forests of the Western Ghats, east of Mangalore, up to about 3,000 feet above the level of the sea. It was somewhat of a surprise to

[1] For a picture of an *Eutermes* soldier, see fig. 10 on pl. 1 of my first paper: the Double-formed Fine Termite.

me to find *Eutermes* among the noxious White Ants; for all the species of it I had so far been able to observe were quite harmless creatures feeding on bits of dry grass only. Yet there could be no doubt about the destructive tendencies of this South Canara species: every piece of wood—trunks of fallen trees, withered and broken off branches, twigs, and the like—lying about on the ground in the neighbourhood of a nest, were attacked, not by a few, but by hundreds or even thousands of individuals. They were certainly the most active and voracious wood-destroyers I had ever met. Their nest is a "carton nest", a large football-like structure hanging high up in a tree and crammed full of an astonishing number of Termites. The live tree however on which the nest is situated they never touch; they build covered tunnels down the trunk to the ground, where they devour whatever wood they can find.

A new and apparently very rare species of *Odontotermes* was taken, feeding on wood, at Khandala and Calcutta. The likeness of the soldiers of this kind to those of *Coptotermes* is remarkable: they have nearly the same brown-red head, the same porcelain-white abdomen, the same milky-white secretion when irritated (for description of *Coptotermes*, see preceding paper, p. 377). But the tooth on their left mandible leaves no doubt that they belong to the genus *Odontotermes*. Moreover their two-sized workers, with blackish abdomen, are recognised at a glance as members of this tribe.

New species of *Microcerotermes* were observed at Mangalore and Navoor, a village at the foot of the Ghats about 50 miles east of the former place. More interesting, from a purely scientific point of view, was the discovery of a colony of *Cryptotermes* at Bangalore, probably the first representative of this genus recorded from the Indian Continent. The nest had been constructed in a dried up stump of a branch of a live *Ficus* tree.

The question has often been put to me: What about the occurrence of wood-destroying Termites in mountainous districts? My observations in the Ghats of South Canara and Mysore have convinced me that, in the said region at least, none are found higher up than 3-4,000 feet above the level of the sea. I have, indeed, taken White Ants on the very top of the Kudre Mukh mountain, *i.e.*, more than 6,000 feet high; but they were of the harmless *Capritermes* kind. The task of removing dry wood and thus making room for fresh growth which is so effectively carried on by wood-eating White Ants in the lower parts of the Ghats, has, in the extensive forests covering the heights above 4,000 feet, apparently devolved on larvæ of various kinds of Coleoptera (*Buprestidæ*, *Longicornia*, etc.). Nearly all the pieces of dry wood I examined up there showed signs of attacks of beetle larvæ; these signs are so characteristic that they cannot be mistaken for Termite feeding figures.

I add a few remarks referring to the moot point, whether Termites destroy live plants and trees. I can only repeat what I wrote in my previous paper (l.c.p. 381, foot note): none of the wood-destroyers I have seen feed on live plant tissue. Wherever I came across green plants or trees infested by Termites—and I have examined a good many—I could always ascertain that only dry and decaying portions of wood, or else mosses and lichens growing on the surface of the bark, were being devoured by the White Ants; where the live tissue began, the tunnels and burrows of the Termites ceased.

I am glad to be able to quote in confirmation of my views the opinion of Mr. A. V. d. Poorten, a Ceylon planter of large experience in cocoanut, etc., cultivation, whose acquaintance I made last May. In the course of our conversation he told me—quite unsolicited on my part—he was convinced that White Ants never started an attack on healthy trees. Where he had found them feeding on trees, the first injuries could, as a rule, be traced to some other cause; the Termites had put in their appearance only later on to complete the destruction of the already diseased portions of the tree.

The following significant fact may throw some light on the belief of many people in India that Termites destroy live plants. During the last two years insects labelled "White Ants, very injurious to crops", were sent to me from three different places, *viz.*, Ranchi, Ahmednagar, and Anand (Nos. 422,10S, and 596 of my collection). Examination of the specimens received showed however that none of them were White Ants, but all belonged to a species of light-brown or yellowish genuine Ants (*Formicidæ*) of the *Dorylus* tribe. This Ant may well be mistaken for a Termite by a casual observer.

Until, therefore, convincing evidence to the contrary is produced I hold that the Termites of the Indian Continent—of others I have no practical experience—are innocent of the damages to crops or live plants so often attributed to them. Either the plants were already diseased when falling a prey to the White Ants, or else the culprit is not a "White Ant," but a "real Ant."

BOMBAY NATURAL HISTORY SOCIETY'S MAMMAL SURVEY OF INDIA, BURMA AND CEYLON.

Report No. 17.

By R. C. Wroughton.

Collection	...	No. 17.
Locality	...	S. Tenasserim.
Date	...	December 1913-April 1914.
Collected by	...	Mr. G. C. Shortridge.
Earlier Reports...	...	No. 1, East Khandesh, Vol. XXI, p. 392, 1912; No. 2, Berars, Vol. XXI, p. 820, 1912; No. 3, Cutch, Vol. XXI, p. 826, 1912; No. 4, Nimar, Vol. XXI, p. 944, 1912; No. 5, Dharwar, Vol. XXI, p. 1170, 1912; No. 6, Kanara, Vol. XXII, p. 29, 1913; No. 7, Central Provinces, Vol. XXII, p. 45, 1913; No. 8, Bellary, Vol. XXII, p. 58, 1913; No. 9. Mysore, Vol. XXII, p. 283, 1913; No. 10, Kathiawar, Vol. XXII, p. 464, 1913; No. 11, Coorg, Vol. XXII, p. 486, 1913; No. 12, Palanpur, Vol. XXII, p. 684, 1913; No. 13, South Ceylon, Vol. XXII, p. 700, 1913; No. 14, N. Shan States, Vol. XXII, p. 710, 1913; No. 15, Kumaon, Vol. XXIII, p. 282, 1914; No. 16, Dry Zone, Central Burma and Mount Popa, Vol. XXIII, p. 460, 1915.

The present collection represents the fauna of the most Southern portion of the Province of Burma. The area covered by it lies between 10° and 13° 30′ N. Latitude, corresponding with the Mergui District of Tenasserim. This District is a long narrow strip, bounded on the West by the Bay of Bengal, and on the East by Siam. In its Northern portion the Tenasserim River runs southward down the centre, separated from the sea by a mountain range, whose highest point is the peak of Myinmoletkat (6,800 ft.). The rest of the District is low-lying broken ground, a good deal of which is covered by the Sea at high tide, and a large amount of the remainder is liable to be flooded during the rains. The total area is 9,798 square miles, and the population about 10 to the square mile. The average rainfall is 163 inches, and the temperature ranges between 93° and 68°. Practically the District, except about 140 square miles of cultivation and perhaps a similar area of old "Toungya" clearings, is under dense forest of which nearly 1,000 square miles is mangrove.

The following are descriptions of the actual camps visited, as furnished by Mr. Shortridge:—

"*Victoria Point.*—Situated at the extreme South of the District. Surrounding country hilly, with no flat country in the immediate neighbourhood. The land around the township has been more or less cleared, and these clearings, being now covered with grass, give the place a somewhat barren appearance during the dry

season. Quite a short distance inland, however, the usual evergreen jungle commences.

Bankachon.—A very small Malay village (Bankasun of Davison), composed of about twenty houses, situated at the high tide limit of one of the many small creeks that flow into the Pakchan River, about 17 miles inland from Victoria Point. With the exception of one or two rubber plantations, this is the only populated spot between the Point and Maliwun. The country is partly flat with mangrove swamps on the Pakchan side of the village. On the other side the hills, that run along the peninsula, here reach a height of less than 1,000 feet. With the exception of a little cultivation round the village, the surrounding country is under dense evergreen jungle.

Maliwun.—A small township, at the head of a creek flowing into the Pakchan. It owes its present existence chiefly to the Burma Development Syndicate, which owns a large rubber estate, and the Kyuli Tin Mines, about four miles further inland. The surrounding country, owing to old 'Taungya' clearings, now under grass, has a more or less open, park-like appearance, which is however again surrounded by evergreen jungle, similar to that round Bankachon.

Victoria Island.—A small island, about 2 miles off Victoria Point. Rough, hilly country, but not rising to more than 200 feet. Covered with the dense evergreen jungle that is characteristic of all the islands of the Mergui Archipelago. A visit of only 2 days was paid, but when the Archipelago is worked later on, a longer camp might well be made.

Mergui Town.—Head-quarters of the District, on an island in the Delta of the Tenasserim River, only separated on one side from the main land by a narrow creek. Situated in Latitude 12° 26′ N., Longitude 98° 36′ E. It is protected by the hill island of Pataw, which helps to form a good natural harbour, and farther out by a ring of islands, including King Island, the largest in the Mergui Archipelago. Population about 12,000. Around the town the country is largely under cultivation, including the 'Crown' and several other Rubber Estates. The remainder of the Island is covered with mangrove and scrub jungle.

Tenasserim Village.—Situated in Latitude 12° 6′ N. and Longitude 99° 3′ E., at the confluence of the great and little Tenasserim Rivers. 45 miles up stream from Mergui. The village, which now contains barely 100 houses, is on low ground, surrounded by fruit orchards, on the site of the ancient city of Tenasserim, which for several hundred years was the principal port of Siam, and the gateway of the most direct route to the Far East. There are still remains of the old walls, enclosing an area of about 4 miles. The city is said to have been founded in 1373, and was conquered and destroyed by the Burmese in 1759. The surrounding country is covered with

secondary growth jungle, and is shut in by hills which rise to upwards of 1,000 feet.

Thaget.—The Tenasserim Hevea Rubber Estate, on the Tenasserim River, about 60 miles above Mergui. It is accessible by launch at all seasons. The area of the Estate is 5,000 acres, of which about 800 acres have been cleared and planted. The average rainfall, 100-110 inches, is strikingly less than that near the coast, or even as far inland as Tenasserim village, where it often exceeds 200 inches.

Tagoot.—About 75 miles up the Tenasserim River, a tin mining district, it is surrounded chiefly by bamboo jungle.

Banlaw.—About 55 miles up the great Tenasserim River. A small village on the North bank, surrounded by fruit orchards. Flat country, paddy fields, and scrub jungle."

In all 1,024 specimens were obtained, of which 4 are missing or have not been sent to me. Twenty-eight others are from places outside the area dealt with in this Report, these will be found listed in a supplement. The remaining 1,000 specimens belong to 64 species, in 52 genera.

A feature of this collection which causes surprise is the almost complete absence of the really small mammals (exclusive of the Bats). One Pigmy Shrew and the specimens of *Chiropodomys* are the only ones which can be placed in this category, even the ubiquitous *Mus booduga* is unrepresented. The constant flooding of such large areas, as reported by Mr. Shortridge, is possibly to a certain extent responsible for this fact. *Chiropodomys* is an arboreal animal, which would be less inconvenienced by floods than *Mus*, *Leggadilla*, &c., but it is probable that large areas of heavy continuous forest is unsuited to the welfare of the smaller types of mammals.

Of the 64 species recorded, more than 40 or 2/3 of the whole are new to our Survey Lists, three are quite new and have been described by Mr. Thomas on an earlier page of this Journal. (Vol. xxiii, pp. 205, 413, 612).

Of the species recorded in this Report, all the true Monkeys; the Bat, *Emballonura monticola*; *Gymnura* and *Galeopterus* among the Insectivores; *Arctictis* and *Hemigalus* among the Carnivores; and the Rodents, *Epimys vociferans*, *E. validus*, *Gunomys varius*, and the bush tailed porcupine (*A. macrourus*) are at or very close to their Northern limit.

Mr. Shortridge records the following notes on animals which he failed to meet with though they have been recorded from this region.

"*Pithecus arctoides.*—I could get no information of any kind of a stump-tailed Monkey in the District.

Pteropus.—Said to be plentiful, especially at Mergui, at certain times of the year.

(If any Member would obtain a series of these they would be a most valuable acquisition. There are three species, one or more of which might be found hereabouts, *viz.*, 1. *Pt. hypomelanus geminorum*, Mill. from S. Twin Islands; 2. *Pt. intermedius*, K. And., from Amherst, the type of which is the only specimen known; 3. *Pt. lylei*, K. And., a dwarf species from S. Siam.)

Felis pardus, L.—Plentiful round Victoria Point, a considerable proportion of specimens being melanistic.

Vernacular name.—RIMAU-BINTANG (Malay, Bankachon).

Felis sp.—A cat, known as KUCHING-JALANG, is said to occur rarely round Bankachon; this may be *F. viverrina*.

Prionodon maculosus, Blanf.—I could get no information about this animal, though a specimen has been recently recorded from Siam, near the Tenasserim boundary.

Cuon rutilans, Muell.—Said to be very rare in the District.

Vernacular name.—SIGALA, or SRIGALA (Malay, Bankachon).

Arctonyx sp.—The Hog-badger appears to be very rare.

Vernacular name.—KHWE-HTU-WET-HTU (Burmese); MAMBARANG (Malay, Bankachon).

Lutra sp.—Otters are said to be fairly numerous inland, but near the Coast and on the lower course of the Tenasserim River they are rare or absent.

Ursus torquatus, Wagn.—Has occasionally been shot by residents.

Vernacular name—BRUANG-OURANG (Malay, Bankachon).

Ursus malayanus, Raff.—Probably more plentiful than *torquatus*.

Vernacular name—BRUANG (Malay, Bankachon).

Elephas.—Elephants were seen round Bankachon and Maliwan.

Vernacular name—GAJA (Malay, Bankachon).

Rhinoceros sondaicus, Cuv.—

Vernacular name—KYANT-SIN (Burmese); BADAK-TAM-PONG (Malay, Bankachon).

Tapirus indicus, Cuv.—Said to be rare round Victoria Point. Mr. C. B. Hall tells me that he once found the remains of one, that had been killed by a tiger, near his Estate.

Vernacular name—GAJA-MENA (Malay, Bankachon).

Bibos gaurus, H. Sm.—Said to be plentiful round Maliwun.

Vernacular name—SLADANG, or SALADANG (Malay, Bankachon).

Bibos sondaicus, Muell.—Said to occur 40 miles inland from Victoria Point.

Vernacular name—SAPI-LUMBOO (Malay, Bankachon).

Capricornis, sp.—Serow are said to exist on the Hills north of the Tenasserim River.

Manis javanica, Desm.—Said to be uncommon.

Vernacular name—TANGILING (Malay, Bankachon)."

Mr. Shortridge records his special obligation to the following gentlemen :—

Mr. G. P. Andrew, I.C.S., Dist. Commissioner.

Mr. C. E. Fisher, Inspector of Police, "placed the local Police boat at my disposal on many occasions, a very considerable help in a country where there are very few means of transport."

Mr. R. Lamb, Estate Manager at Maliwun under the Burma Development Syndicate, " put me up and gave me every assistance."

Mr. C. F. S. Bilbrough, the owner of Victoria Island, " has promised to help in every possible way when a more exhaustive survey of this Island is undertaken."

Mr. J. Taylor, Manager of the Hevea Rubber Estate at Thaget, " gave me every help."

(Before going on to my detailed report, I would venture to point out that if any of our members resident in these parts could and would obtain more specimens of the Pipistrel obtained by Mr. Shortridge at Maliwun, such would be most valuable.)

(1) Hylobates lar, L.

The White-handed Gibbon.

1771. *Homo lar*, Linnaeus, Mantissa, App., p. 521.
1888. *Hylobates lar*, Blanford, Mammalia No. 2.

♂17, ♀ 10, Bankachon; ♂1, Tenasserim; ♂1, ♀2, Thaget.

H. lar much resembles *H. hoolock* except for its white hands and feet. Blanford says of its colour " occasionally much variegated ", but in the present series the specimens are either jet black or fulvous, with a darker shade on the back, the latter much predominating.

" Very plentiful around Victoria Point. Although not avoiding the neighbourhood of habitations, Gibbons hardly ever leave the forests and are probably seldom destructive to ground crops. They are particularly noisy in the early mornings and evenings. The calls of all Gibbons have a certain resemblance to each other, consisting in the case of this species of a series of rapid whoops, ascending and descending through several octaves, rather resembling a siren and are amongst the most striking and musical sounds to be heard in any tropical jungle. They are nearly always gregarious, going about in parties of about a dozen; where they are numerous, several parties may sometimes mingle together temporarily, but I have never seen flocks of a hundred or more as reported by Blanford. *H. lar* is excluded in Davison's list of Mammals from Bankachon."

Weights.—♂, 16¾ lbs:, ♀, 15 lbs.

Vernacular name—Mawa (Malay, Bankachon).

(2) Pithecus fascicularis, Raffles.

The Crab-eating Monkey.

1822. *Simia fascicularis*, Raffles, Trans. Linn. Soc., XIII, p. 246.
1825. *Macacus carbonarius*, F. Cuvier, Hist. Nat. Mamm., pl. XXXII.
1831. *Macacus aureus*, Is. Geoffroy, Voy. Bel. Zool., p. 58.

1888. *Macacus cynomolgus*, Blanford, Mammalia No. 9.
♂1, Victoria Island; ♀1, Bankachon; ♂1, Mergui; ♂3, ♀9, Tenasserim; ♂5, ♀3, Thaget; ♂2, Banlaw.

This Macaque is not strikingly different from the common "Bengal Monkey" except in its far longer tail, which is scarcely shorter than the combined head and body, while in the Indian Monkey it is less than ¾ that length. In size the two are identical.

Blanford recognises that "*cynomolgos*" of Linnaeus is a totally different animal but retained the name for convenience, which is of course inadmissible. He includes in his synonymy the name *irus* proposed by F. Cuvier in 1818. Bonhote dealt with the matter in 1903 (Fascic. Malay 1, p. 4) and showed that *irus* was based on a Senegal Monkey and that the earliest name for the Malay-Tenasserim long tailed Macaque is *fascicularis* of Raffles. Later Dr. Elliot in his Review of the Primates, 1913, p. 229, revives *irus* as a name for a Burma-Malay Macaque 'with black feet' (a character originally postulated by Cuvier) but, though some specimens seem to have somewhat darker feet, I have found no Oriental Macaque with black feet in the National Collection. I have therefore followed Bonhote, Miller, &c., in adopting the name *fascicularis*. This monkey seems to vary a good deal in colouring, but these variations would seem to be individual and perhaps even seasonal. These variations account for the names *carbonarius* and *aureus* in the synonymy given above.

"Although extremely plentiful where it occurs, this species is here entirely confined to the neighbourhood of Mangrove Swamps along the Sea-shore, and the banks of rivers. Its chief habitat is along the edges of tidal creeks where at low tide it feeds on molluscs, crustaceans and other marine animals. It was so local round Victoria Point that, although swarming along the banks of the Pakchan River, it was not once seen near Bankachon only a few miles away from the River.

Weight.—♀, 10½ lbs.

Vernacular name.—Kra (Malay, Bankachon.)"—G. C. S.

(3) Pithecus adustus, Mill.

The Malay pig-tailed Monkey.

1888. *Macacus nemestrinus*, Blanford, Mammalia No. 8.
1906. *Macaca adusta*, Miller, Proc. U. S. Nat. Mus., XXIX, p. 559.
♂3, ♀4, Bankachon.

About the size of, or rather smaller than, the 'Bengal Monkey' but more stoutly built. Dark brown in colour. In *nemestrinus* from Sumatra there is a broad black stripe down the centre of the back which is obsolescent or entirely wanting in the Malay animal.

Miller distinguished *adustus* (Type locality Champang, Tenasserim) from *nemestrinus*, which was named by Linnæus from Sumatra, by the almost complete absence of the dorsal black stripe and by the black annulations present on the hairs of the back. There are also skull differences and the male canines are less developed than in *nemestrinus*.

"Plentiful, although not to the same degree as *H. lar* and *P. obscurus*. Like other Macaques, this species is very variable in size, and there is also a considerable difference in size between the sexes. During life the eye orbits in adults are bluish. Gregarious, and when occurring in numbers around villages it is said to be very destructive among rice fields. The cheek pouches of most of the specimens obtained were full of rice. This species is very often seen in confinement.

Weight.—♂, 18 lbs.; ♀, 10¼ lbs.

Vernacular names.—Bruh, Bruh-tana (Malay, Bankachon)."—G. C. S.

(4) Presbytis obscurus, Reid.

The Dusky Leaf-Monkey.

1837. *Semnopithecus obscurus*, Reid, P. Z. S., p. 14.
1888. *Semnopithecus obscurus*, Blanford, Mammalia No. 24.

♂ 5, ♀ 12, Bankachon ; ♂ 2, Tenasserim ; ♂ 1, Thaget.

This is a dark coloured Langur. Brownish black above, paler on the shoulders and forearms, tail silver-grey. Under side, hind limbs and crown of the head greyish-white, hands and feet black.

In his synonymy Blanford says Reid gave no description but this is incorrect. The full passage referred to is as follows :—" Mr. James Reid exhibited to the Meeting, and characterised as new, under the name *obscurus*, a dark-coloured monkey, from the Society's Collection, belonging to the Genus *Semnopithecus*. The locality of the particular specimen before the Meeting was unknown. " This is technically a ' good ' description if the name can be assigned, on reasonable evidence, to the animal in question. (There are two specimens in the National Collection, either of which might be the type, but I have failed, in spite of careful enquiry, to obtain any history which would connect either of them with Reid's specimen.) However in the following year Martin, Superintendent of the Museum of the Zoological Society, published a Monograph of the Genus *Semnopithecus* (Charlesworth's Mag. Nat. Hist., II, p. 434) in which he includes " *S. obscurus*, Reid. " He says: " This Species was lately described as new at the scientific meeting of the Zoological Society, 1837", and gives an unmistakeable dèscription of the present animal. There can be no doubt that the present animal is Reid's *obscurus* and the name must stand on his authority.

" Almost as plentiful as *H. lar*, but a much less noisy animal. Its alarm note is almost like that of a Macaque, and quite unlike the curious hoot of the Indian Langurs. It is rather shy and keeps well within the thickest jungles.

The white orbital regions and the pinkish-white round the mouth are as in *phayrei*, except that the orbits are not bluish but rather dead white, and do not surround but extend in semi-circles round the upper and outer margins of the eyes only. The area round the mouth is also less clearly defined, being often mottled round its edges. The hair on the crown, though long and very silky, does not form a true crest. The newly born young are bright golden yellow in colour, in rare cases this colour is retained through life.

Weight.—♂, 19½ lbs., ♀, 19 lbs.

Vernacular names.—Lutong, Lutong-laboo (Malay, Bankachon)." —G.C.S.

(5) Presbytis femoralis keatii, Rob. and Kl.

Keat's Leaf Monkey.

1830. *Semnopithecus femoralis*, Horsf., App., Life of Sir T. S. Raffles (no description).
1833. *Semnopithecus femoralis*, Martin, Charlesworth's Mag., N. H., II, p. 436.
1876. *Semnopithecus neglectus*, Schlegel, Mus. Pays. Bas., XII, p. 47.
1888. *Semnopithecus femoralis*, Blanford, Mammalia No. 25.
1911. *Presbytis neglecta keatii*, Robinson and Kloss, Journ. Fed. Mal. St. Mus., IV, p. 174.

♂ 3, ♀ 1, Bankachon.

A black-brown Langur, with the inside of the thigh, in a narrowing line down the inside of the hind leg, to the heel, pure white.

"Apparently not at all plentiful—possibly only just extending into Tenasserim—and rather shy. The facial area is very small and quite unlike other Burmese and Indian Langurs. The mouth has the usual pinkish-white area but the orbital region, though pale, is dusky flesh colour and not a conspicuous feature. The two radiating centres on the forehead are hardly visible during life, though very noticeable in dry skins.

Weight.—♂, 15½ lbs., ♀, 14½ lbs.

Vernacular name.—LUTONG-KOKA (Malay? Bankachon.)"—G.C.S.

(6) NYCTICEBUS COUCANG, Bodd.

The Slow Loris.

1785. *Tardigradus coucang*, Boddaert, Elench. Anim., Vol. I., p. 67.
1812. *Nycticebus bengalensis*, Geoffroy, Ann. Mus., XIX, p. 164.
1867. *Nycticebus cinereus*, Milne Edwards, Nouv. Arch.du. Mus., III., p. 1.
1888. *Nycticebus tardigradus*, Blanford, Mammalia No. 26.

♂ 1, Mergui.

Thomas has shown that the *tardigradus* of Linnaeus refers to the Ceylonese Slender Loris. The next oldest name is *coucang*, Bodd. The name was given to Pennant's "Tailless Maucauco" from Bengal. We have no specimen of a Bengal individual but when such is available, if it prove to be distinct from the Tenasserim animal, the latter will have to take the name *cinereus*, M.Edw. I have compared this specimen with one of the co-types of *cinereus* and cannot detect any difference.

This is a pretty little animal about 12 or 13 inches long. It has practically no tail. The hair is long, soft and curly. The colour is a warm grey, washed more or less over the whole upper side of the body with rusty. There is a narrow dark line from the base of the tail forward to the crown; at that point lines branch to the ears and eyes.

"Apparently fairly well known on Mergui Island. Very savage, growling like a cat when approached and always ready to attack anything placed near it. Except for its rather slower movements very similar in general habits to the Slender Loris.

Weight.—3¼ lbs."—G.C.S.

(7) ROUSETTUS LESCHENAULTI, Desm.

The Fulvous Fruit Bat.

(Synonymy in No. 11.)

♂ 5, ♀ 6, Tagoot.

(*See* also Reports Nos. 15 and 16.)

(8) CYNOPTERUS BRACHYOTIS ANGULATUS, Mill.

The Malay Short-nosed Fruit Bat.

1839. *Cynopterus brachyotis*, Müller, Tigd. Nat. Gesch., V., p. 146.
1891. *Cynopterus brachyotis*, Blandford, Mammalia No. 139.
1898. *Cynopterus angulatus*, Miller, Proc. Ac. N. Sci. Philad., p. 316.

♂ 1, Victoria Point; ♂ 2, ♀ 8, Bankachon; ♂ 4, ♀ 22, Tenasserim.

This Bat differs from *Cynopterus sphinx*, the common Fruit Bat of India, rather in size than in colouring. The fore arm is shorter and the ears relatively smaller.

"Plentiful, roosting by day on the under sides of palm and plantain leaves, sometimes singly or in pairs, but more usually in small colonies.

Vernacular name.—KLAWA (all small bats) (Malay, Bankachon)."—G.C.S.

(9) EONYCTERIS SPELAEA, Dobs.

Dobson's Long-tongued Fruit Bat.

1871. *Macroglossus spelaeus*, Dobson, Proc. A. S. B., pp. 105, 106.
1891. *Eonycteris spelœa*, Blanford, Mammalia No. 144.

♂11, ♀7, Tagoot.

This bat rather resembles *Rousettus*, but is more warmly coloured above and darker below, but is at once separable from any of that genus as well as from *Cynopterus*, by the absence of a claw on the index finger.

"Plentiful in a cave near Tagoot, in company with other small Fruit Bats and *Emballonuridæ*."—G.C.S.

(10) MACROGLOSSUS MINIMUS SOBRINUS, K. And.

The small Long-tongued Fruit-Bat.

1810. *Pteropus minimus*, Geoffroy. Ann: Mus: d' H. N. XV. p. 97.
1891. *Carponycteris minima*, Blanford. Mammalia. No. 143.
1911. *Macroglossus minimus sobrinus*, K. Andersen, A.M.N.H. VII. p. 642.

1 (juv.)..Bankachon.

The specimen is too young for confident identification. Dr. Andersen in his Catalogue of the Chiroptera (p. 761) writes "It is probably this form which has been recorded in literature from Tenasserim." I have therefore ranked it under that name.

(11) NYCTERIS JAVANICA, Geoff.

The Javan Long-eared Bat.

1813. *Nycteris javanicus*, Geoffroy, Am. du. Mus. XX., p. 20.

♂1, ♀1, Bankachon.

This Bat somewhat resembles a Megaderm, especially in its very large ears and the presence of both a nose leaf and a tragus, the latter however is very small. Blanford does not include this species in his Fauna but quotes Dobson to the effect that it had been found in the Malay Peninsula and Java. (Mammalia, p. 295.) It is the only species found in the Oriental Region, all the rest of the Genus being African. These so far as I can discern are the first specimens taken within Indian limits.

"A single pair were driven out of a porcupine burrow in thick evergreen forest by one of my ferrets."—G.C.S.

(12) RHINOLOPHUS LUCTUS, Temm.

The Malayan Great Horse-shoe Bat.

1835. *Rhinolophus luctus*, Temminck. Mon. Mamm., II., p. 24.
1842. *Rhinolophus morio*, Gray, A. M. N. H., X., p. 257.
1891. *Rhinolophus luctus*, Blanford, Mammalia No. 145 (partim).

♀1, Bankachon.

Dr. Andersen has recognised *perniger*, Hodgs., as a separate species and has established *beddomei* to represent the North Indian (Himalayan) and the South Indian forms respectively. All three are included by Blanford under the name *luctus*. It is a large, black *Rhinolophus*, with a large and complicated nose-leaf.

"This specimen was found roosting by itself during the day in thick foliage. All allied species hitherto found were in hollow trees, caves or wells, but always singly or in pairs."—G.C.S.

(13) RHINOLOPHUS TRIFOLIATUS, Temm.

The Trefoil Horse-shoe Bat.

1835. *Rhinolophus trifoliatus*, Temminck, Mon. Mamm., II, p. 27.
1891. *Rhinolophus trifoliatus*, Blanford, Mammalia No. 147.

♀ 2, Bankachon.

This would seem to be a rare Bat. It is of medium size and a pale colour; the nose leaf, though proportionally large, is not so complicated as in *luctus*, with which it is fairly closely related.

"Both these specimens were found by day, roosting in thick foliage".—G.C.S.

(14) HIPPOSIDEROS FULVUS, Gray.

The Bicoloured Leaf-nosed Bat.

(Synonymy in No. 3.)

♀ 1, Bankachon; ♂ 1, ♀ 3, Tenasserim.

(*See* also former Reports Nos. 3, 5, 6, 7, 8, 9, 10, 12, 13, 14 and 16.)

"This species was found roosting by itself, inside a house".—G.C.S.

(15) HIPPOSIDEROS LARVATUS, Horsf.

Horsfield's Leaf-nosed Bat.

1824. *Rhinolophus larvatus*, Horsfield, Res. Java pt. VI.
1824. *Rhinolophus vulgaris*, Horsfield, l, c.
1824. *Rhinolophus deformis*, Horsfield, l, c.
1824. *Rhinolophus insignis*, Horsfield, l, c.
1891. *Hipposiderus larvatus*, Blanford, Mammalia No. 165.

♂ 14, ♀ 9, in al. 4, Bankachon.

A medium sized *Hipposideros*, with 3 supplementary leaflets in the nose leaf, as in *dukhunensis*. Like *fulvus* it is most variable in colour; in the present series there are specimens which are quite brown, while others are flaring ochraceous rufous, and there are others of intermediate shades. It is markedly larger and stouter than *dukhunensis*.

"Found swarming in the shafts of the Kyuli Tin Mines near Maliwun."—G.C.S.

(16) MEGADERMA SPASMA TRIFOLIUM, Geoff.

The Malay Vampire Bat.

(Synonymy in No. 5.)

♂ 1, Victoria Point; ♂ 1, Bankachon.

(*See* also Reports Nos. 6, 11, and 16.)

"Only two specimens were obtained, both found roosting, singly, inside verandahs."—G.C.S.

(17) PIPISTRELLUS LOPHURUS, Thos.

The Tuft-tailed Pipistrel.

1915. *Pipistrellus lophurus*, Thomas, Journ., B.N.H.S., Vol., XXIII, p. 413.

♂ 1, Maliwun.

This species is described by Mr. Thomas on an earlier page.

The most striking outwardly visible character is the tuft of hairs on a gland at the base of the tail.

"This was the only Pipistrel observed during the whole of my stay at Victoria Point."—G. C. S.

(18) SCOTOPHILUS WROUGHTONI, Thos.

Wroughton's Bat.

(Synonymy in No. 1.)

♂ 3, ♀ 6, Tenasserim Town ; ♂ 1, Pyinmana. T. A. Hauxwell, I. F. S.

(*See* also Reports Nos. 5, 6, 7, 9, 10, 11, 12, 15 and 16.)

"Found roosting in company with *T. longimanus*."—G. C. S.

(19) TYLONYCTERIS PACHYPUS, Temm.

The Club-footed Bat.

(Synonymy in No. 5.)

♂ 1, ♀ 3, Bankachon ; ♂ 2, Thaget.

(*See* also Reports Nos. 6, 11 and 14.)

"Not observed to be plentiful. Bats, especially the early flying *Vespertilionidæ*, were by no means so plentiful as might have been expected at Victoria Point."—G. C. S.

(20) MYOTIS MURICOLA, Gray.

The Wall Bat.

1841. *Vespertilio muricola*, Hodgson, J. A. S. B., X, p. 908 (no description).
1846. *Vespertilio muricola*, Grey, Cat. Mamm. Nep. Thib, p. 4.
1891. *Vespertilio muricola*, Blanford, Mammalia No. 212.
♂ 1, Tenasserim.

Mr. Thomas, who has kindly examined this Bat, furnishes the following note :—

"This specimen has the posterior of the two small premolars more internal than usual, not visible externally. But examples from Selangore (Butler) and Java (Shortridge) agree with the type from Nepal, so that the variation does not seem to be geographical.

It may be noted that the type of *M. siligorensis*, Tomes, (with which *M. darjelingensis*, in the absence of a type, may be synonymized) proves to be the species with extraordinarily small canines described by Dobson as *Vespertilio nepalensis*.

V. caliginosus, Tomes, and *V. blanfordi*, Dobs., as exemplified by typical specimens, both appear to be referable to *M. mystacinus*. Should the Indian form of this Bat prove separable from the European, the former of these names would be applicable to it."—O. T.

"A fairly early flier, apparently seldom leaving the shelter of trees."—G. C. S.

(21) EMBALLONURA MONTICOLA, Temm.

The Malay Sheath-tailed Bat.

1839. *Emballonura monticola*, Temminck, Tijd. & Nat. Gesch., V, p. 25.
1891. *Emballonura semicaudata*, Blanford, Mammalia No. 217.

1898. *Emballonura peninsularis*, Miller, Proc. Ac. Nat. Sc. Phil., p. 323.
♂29, ♀19, in al. 12, Victoria Point; ♀1, Bankachon.

This small bat at first sight looks like *Pipistrellus ceylonicus*, but the tail is much shorter than the interfemoral membrane, from which only the extreme tip of it protrudes, this distinguishing it from its near relation *Taphozous*. The type locality is Java.

Mr. Thomas, who has most kindly compared these specimens, gives me the following note for the Report:—

"These specimens, like those referred to in 1909 (Thomas & Wroughton. Journ., Fed. Mal. States Mus., Vol IV., p. 110, 1909) represent Miller's *E. peninsularis*, but as further comparison fails to reveal the slightest difference between them and representative examples of *E. monticola* from Java, I now use the earlier name.

This is the most northern record of the genus *Emballonura*, Mr. Miller's examples of *E. peninsularis* having come from Trong".—O. T.

"A colony of from 100 to 150 was found in a small rock cave, among some boulders, in the bed of a small hill stream, in thick evergreen forest about 4 miles from Victoria Point. A few specimens were observed around Bankachon. It is an early flier and its flight is very like that of a Pipistrel.

Weight of 6 specimens—$1\frac{1}{8}$ ozs."—G. C. S.

(22) TAPHOZOUS MELANOPOGON, Temm.

The Black-bearded Sheath-tailed Bat.

(Synonymy in No. 1.)

♂4, Tagoot.

(*See* also Reports Nos. 2, 3, 4, 6, 7, 8, 10, and 16.)

"Taken in a cave near Tagoot, where it was the least plentiful of several species found there."—G.C.S.

(23) TAPHOZOUS LONGIMANUS, Hardw.

The Long-armed Sheath-tailed Bat.

(Synonymy in No. 6.)

♂3, ♀20, Tenasserim Village.

(*See* also Reports Nos. 7, 8, 9, 12, and 16.)

(24) CHOEREPHON PLICATUS, Buch.

The Indian Wrinkle-lipped Bat.

1800. *Vespertilio plicatus*, Buchanan, Trans. L. S. V., p. 261.
1824. *Nyctinomus tenuis*, Horsfield, Zool. Res. Java.
1830. *Dysopes murinus*, Gray and Hardwicke, Ill. Ind. Zool., I., pl. 1.
1891. *Nyctinomus plicatus*, Blanford, Mammalia No. 225.
♂27, ♀16, in al. 25, Tagoot.

The type locality of this Bat is "Puttahaut, in Bengal". It generally resembles *Nyctinonus trayatus*, like which it has the upper lip vertically wrinkled, but the tail is longer and more than half of it extends beyond the interfemoral membrane. *C. plicatus*, however, is easily recognised by its bicoloured underside, the throat being brown while all the rest of the underside is washed with white contrasting strongly with the throat colour.

"Found in swarms in a cave near Tagoot, in company with several other species, all of which it outnumbered considerably."—G. C. S.

(25) Tupaia belangeri, Wagn.

The Tenasserim Tree Shrew.

1841. *Cladobates belangeri*, Wagner., Schr. Saug. Supp. II, p. 42.
1842. *Tupaia peguanus*, Lesson, Nouv. Tab. Mamm., p. 93.
1888. *Tupaia ferruginea*, Blanford, Mammalia No. 102.
♂ 2, Victoria Point; ♂ 7, ♂ 6, Bankachon; ♂ 5, ♂ 2, Tenasserim Village; ♂ 2, Tagoot; ♂ 4, ♂ 1, Banlaw.

The type locality of *T. ferruginea* is Sumatra, it belongs to a section of the Genus with two pairs of mammae, whereas the present animal has three. *T. belangeri* was first taken at Siriam near Rangoon; it differs chiefly in colour from *chinensis*, And. (Kakhyen Hills) and *siccata*, Thos. (Dry Zone and Shan States) and these latter must both rank as geographical races of *belangeri*.

"Tree shrews were no more numerous here than in the almost treeless portions of the Dry Zone; there, however, they frequented chiefly the trees planted round the villages.

Weight.—$4\frac{1}{4}$-$5\frac{1}{4}$ ozs.

Vernacular name—Tupai-tana (Malay, Bankachon)."—G. C. S.

(26) Gymnura gymnura, Raffles.

Raffles's Gymnura.

1822. *Viverra gymnura*, Raffles, Trans. Linn. Soc., XIII, p. 272.
1827. *Gymnura rafflesi*, Horsfield and Vigors, Zool. Journ., III, p. 248.
1888. *Gymnura rafflesi*, Blanford, Mammalia No. 109.
♂ 6, ♂ 3, Bankachon.

This animal was first described under the specific name *gymnura* by Raffles. Later Horsfield and Vigors established a new genus to receive it which they called also *Gymnura* and changed the specific name to *rafflesi*. For this latter however there was no authority, hence the species must stand under the name I have given it above.

This animal is perhaps most like a Bandicoot, but the snout is much elongated. The head, shoulders and about half the back are white with a varying admixture of black hairs. (There is a black streak over the eye varying in size and intensity in various individuals.) The whole of the rest of the body and limbs is black. The tail is naked, black at the base, white towards the tip. The head and body measure 12 to 14 inches, the tail 9 to 10 and the weight is from 2 to $2\frac{1}{2}$ lbs.

"Quite plentiful round Bankachon but extremely local. The habits of *Gymnura* when known make it a fairly easy animal to look for.

At Bankachon they frequented the neighbourhood of the small forest streams, which flow from the hills into the Pakchan river, but apparently only near their sources, before they entered the Mangrove Swamps and became tidal. Their tracks, which were never at any distance from water, were very easy to find, being most numerous up and down the sandy, half dry beds of these streams. As a rule, most small mammals seem to prefer the edges to the sodden, dark interior of evergreen forests, but the tracks of *Gymnura* were only found where the streams flowed through the very depth of the jungle. Their hiding places were sometimes among the overhanging roots of trees near the stream, or else in holes like those of bandicoots, which had evidently been excavated by themselves.

When caught alive *Gymnura* is extremely savage, and bites at anything within reach with an accompaniment of snarls and growls. Two of my ferrets were pitted against one of these animals, the *Gymnura*, although

disabled when brought in, held its own for a considerable time, its skin, which is very loose, affording a very poor hold for the ferrets, which received several severe bites. The stomachs of two specimens examined contained remains of cockroaches, crickets, beetles, various larvæ, and a millipede, besides some vegetable matter, consisting of one or two small leaves which had been swallowed entire and the remains of a few small berries.

They are apparently not easily trapped, the present specimens were caught by means of snares, set in their runs and outside their burrows.

While possessing a most objectionable smell, it does not possess the power of ejecting it, as in the Skunk.

During life the long hairs of the back form a narrow compressed crest running from the head to a little beyond the shoulders, and the flattened white hairs have a peculiar soapy feeling. Tail distinctly compressed laterally. The snout is a very sensitive organ and is constantly being twisted about. Ears and bare portions of snout are pink. The villagers of Bankachon value the bones of this animal as medicine.

Weight.—$2\frac{1}{4}$-$3\frac{1}{4}$ lbs.

Vernacular name.—TIKOS-ANTOO (Malay, Bankachon)."—G. C. S.

(27) PACHYURA Sp.

Shrews.

♂ 1, ♀ 1, Mergui.

"Obtained in the native bazaar, Mergui Town."—G. C. S.

(28) PACHYURA NUDIPES, Bl.

The Burmese Pigmy Shrew.

1856. *Sorex nudipes*, Blyth, J. A. S. B., XXIV, p. 34.
1888. *Crocidura perrotteti*, Blanford, Mammalia No. 125 (partim).
♂ 1, Banlaw.

This name was established by Blyth on a specimen from Mergui. The skull of the present specimen seems to give slightly larger measurements than those of specimens which we have called *perrotteti* and *hodgsoni*, for example the inner lobe of m^2 measures in antero posterior diameter 0·9 mm., while in the other species it is 0·7 mm. I have therefore adopted the name *nudipes* as at any rate geographically fitting it.

"Taken in thick jungle, close to Banlaw village."—G. C. S.

(29) GALEOPTERUS PENINSULÆ, Thos.

The Malay Flying Lemur.

1888. *Galeopithecus volans*, Blanford, Mammalia No. 133.
1908. *Galeopterus peninsulæ*, Thomas, A. M. N. H., II., p. 303.
♂ 5, Bankachon.

In 1908 (A. M. N. H., I., p. 252). Thomas dealt with the nomenclature of the whole of the Flying Lemurs, putting them in two Genera, *viz.*:—*Galeopterus* represented by the Sumatran form *temminckii*, Waterhouse, and *Cynocephalus* represented by *Lemur volans*, L. from the Philippines. Later in the same year (l. c. II., p. 303) he separated the Malayan *Galeopterus* from *temminckii* under the name *peninsulæ*.

This animal seems to bear the same relation to the Tupaias as *Petaurista* does to the smaller squirrels. It measures about 24 inches in length over

all, of which from one-fourth to one-third is tail. It has membranes joining the fore and hind limbs, reaching to the wrist and ankle. Moreover the toes of all four feet are webbed right up to the claws which are sharp and curved, like miniature tiger claws.

"Probably fairly numerous, but not at all an easy animal to find except on moonlight nights, when they may be occasionally seen gliding from tree to tree like a flying squirrel. During the day they hide, often in hollow trees or among thick foliage, always at a considerable distance from the ground, when they are most difficult to find, their matted fur exactly matching the bark of a tree.

Except in flight, their movements are quite unlike those of Flying Squirrels; they move about slowly like a *Loris* and appear to be considerably hampered by their parachutes. The tail, like that of some bats, is usually kept more or less curled up under the body.

There is a gland near the root of the tail, situated in a shallow pouch, which in adults is bright orange in colour and rather sticky, but there is no perceptible smell. During life there is a distinct suffusion of green, especially on the back and upper side of the parachute, which almost disappears when the skin becomes dry. I have remarked a somewhat similar phenomenon in some Tupaias.

The contents of the stomach were entirely vegetable, and appeared to consist of leaves, there were no seeds, nor traces of any kind of fruit.

Ears amber yellow, iris rather light brown.

Weight.—$2\frac{1}{2}$-$3\frac{1}{2}$ lbs.

Vernacular name.—TUPAI-KARBA (Malay, Bankachon)."—G. C. S.

(30) FELIS TIGRIS, L.

The Tiger.

1766. *Felis tigris*, L., Syst. Nat., I., p., 61; Blanford, Mammalia No. 29.

♂ 1, Bankachon.

"Plentiful in Southern Tenasserim. ♂, 7th February 1914, weight 382 lbs., length between pegs $8\frac{1}{2}$ feet. Length of head and body 1,800 mm.; tail 920, hind foot 365, ear 124, height at shoulders to tip of foot 1,035, girth behind shoulders 1,215, girth in front of hind quarters 1,085, girth of neck 705. Tigers are believed to run smaller in Tenasserim than in India and although this specimen would not be above the average for an Indian individual, it is considered very large for these parts.

Vernacular name.—RIMAU (Malay, Bankachon)"—G. C. S.

(31) FELIS BENGALENSIS, Kerr.

The Leopard Cat.

(Synonymy in No. 11.)

♂ 2 (juv.), Bankachon; ♀ 1, juv. 1, Mergui Town.

(*See* also Reports Nos. 14, 15 and 16).

(32) FELIS.

Domestic Cat.

♀ 1, Victoria Point.

"This specimen was shot in thick jungle near Victoria Point, and had possibly run wild. In colour it resembles a number of domestic cats observed in the District.

Vernacular name.—KUCHING (Malay, Bankachon)."—G. C. S.

(33) VIVERRA ZIBETHA, L.

The Large Indian Civet.

(Synonymy in No. 14.)

♂2, ♀2, Bankachon; ♂ 1, ♂ 1, Thaget.

"Plentiful, like all the Civets, it is very easily trapped.

Vernacular name (for all Civets)—MUSANG (Malay, Bankachon)."—G. C. S.

(34) VIVERRA MEGASPILA, Bl.

The Burmese Civet.

(Synonymy in No. 16.)

♀1, Victoria Point; ♀2, Tenasserim.

"Very similar in general appearance to *V. zibetha*, except that its head is more massive and has a swollen appearance about the muzzle. It does not smell nearly so strong of Civet as *zibetha*. I have never seen any species of *Viverra* climb a tree, though no doubt well able to do so if they chose.

Weight.—♀, 19 lbs."—G. C. S.

(35) PARADOXURUS HERMAPHRODITUS, Pall.

The Malayan Palm Civet.

(Synonymy in No. 16.)

♂1, Bankachon; 1, Mergui; ♂4, ♀2, 1, Tenasserim.

"Plentiful around villages, hiding by day in the roofs of houses. Weight.—♂, 5¼-6 lbs."—G. C. S.

(36) PAGUMA LEUCOMYSTAX ROBUSTA, Mill.

The Tenasserim White-whiskered Palm Civet.

1888. *Paradoxurus leucomystax*, Blanford, Mammalia, p. 114.
1906. *Paradoxurus robustus*, Miller, Proc. Biol. Soc. Wash, XIX, p. 26.

♂3, ♀2, Bankachon.

The species *P. leucomystax* outwardly closely resembles *P. grayi*, but it has a striking white patch on the face, between the eye and the ear, which differentiates it at a glance.

"Very plentiful inland from Victoria Point, seeming to be even more numerous than *P. hermaphroditus*. In common with all species of *Paradoxurus*, this animal is a great ratter, but unlike the small *Felidæ*, it is seldom particularly destructive to poultry.

Weight.—♂, 12½ lbs.; ♀, 9¼ lbs."—G. C. S.

(37) ARCTOGALIDIA LEUCOTIS, Horsf.

The Small-toothed Palm Civet.

1881. *Paradoxurus leucotis*, Horsfield, Cat. Mamm., p. 66.
1877. *Paradoxurus prehensilis*, Sclater, P. Z. S., p. 681.
1888. *Arctogale leucotis*, Blanford, Mammalia No. 56.

♂2, ♀2, in al. 3, Tenasserim.

An animal of the ordinary Palm Civet type, of a pale brown colour with central dorsal stripe (dark brown) and a row of spots of the same colour on each side of it. The tail is long and thin, coloured like the back at its base gradually darkening to that of the dorsal stripe. The type locality is Tenasserim.

"These specimens were shot by moonlight in trees round Tenasserim Village. Thoroughly arboreal and in appearance a typical small sized paradoxure, but more slender and lightly built. The stomachs of specimens examined contained remains of squirrels. Though no doubt to some extent frugiverous, all the Palm Civets live largely on squirrels and are a considerable factor in keeping down the numbers of squirrels which are so destructive to the Cocoanuts.

Weight.—4½ lbs."—G. C. S.

(38) HEMIGALUS DERBIANUS INCURSOR, Thos.

The Banded Palm Civet.

1830. *Viverra hardwickii*, Gray (preoccupied).
1837. *Paradoxurus derbyanus*, Gray, Charl. M. N. H., I., p. 579.
1837. *Paradoxurus zebra*, Gray (l. c.).
1838. *Viverra boiei*, Mueller, Tiddsch. Nat. Ges., V., p. 144.
1888. *Hemigale hardwickei*, Blanford, Mammalia, p. 117.
1915. *Hemigalus derbianus incursor*, Thomas, Journ., B. N. H. S., XXIII, p. 613.

About the size of *P. hermaphroditus*. It has close, short fur of a buffy grey colour marked with a black longitudinal stripe running from each ear backwards, to meet a broader transverse band across the shoulders. Behind are 4 or 5 more broad transverse black stripes on the back, the tail also being banded black. It has in fact the same colour pattern as *Prionodon maculosus* but *Hemigalus* is twice the size of that animal.

"Apparently not at all plentiful. The Malay villagers at Bankachon had no name for it. It has absolutely no smell. Tongue very rough, much more so than in other small carnivores. Probably one of the most active of all viverrine animals, and without doubt largely arboreal. When caught alive it is very savage and growls like a cat.

Weight.—♂, 4-5 lbs."—G. C. S.

(39) ARCTICTIS BINTURONG, Raffles.

The Cat Bear.

1822. *Viverra binturong*, Raffles, Linn. Trans., XIII, p. 253.
1888. *Arctictis binturong*, Blanford, Mammalia.

2 (no skulls), Tenasserim.

"These two skins were obtained by natives near Tenasserim Village. It seems to be an uncommon animal and was not recognised by many of the inhabitants."—G. C. S.

(40) MARTES FLAVIGULA PENINSULARIS, Bonh.

The Malay Marten.

1888. *Mustela flavigula*, Blanford, Mammalia No. 77 (partim).
1901. *Mustela flavigula peninsularis*, Bonhote, A. M. N. H., VII, p. 346.

♀ 2, Bankachon.

Bonhote dealt with this group of Martens in 1901 (l. c.) He distinguished the present form from true *flavigula* by its naked soles; its pale colour across the shoulders distinguishing it from the more southern form (Sumatra, Java, Borneo).

"These two specimens were shot together high up in a tree in thick forest. Without doubt more or less diurnal, as these specimens were evidently hunting. Although not unpleasantly strong, they had the characteristic polecat smell.

Weight.—4¼ lbs.

Vernacular name.—BANGBONE (Malay, Bankachon)."—G. C. S.

(41) PETAURISTA TAYLORI, Thos.

Taylor's Flying Squirrel.

1914. *Petaurista taylori*, Thomas, Journ., B. N. H. S., XXIII, p. 205.
♂ 1 (no skull), Bankachon.

This animal is related to *P. yunnanensis* (cf. Blanford, Mamm. No. 230) and *P. candidulus*, Wroughton, especially to the latter. It is a fairly uniform chestnut all over, the strong grizzling of white, so characteristic of *candidulus*, is limited to a small area on the centre of the back and to the forehead. The base of the tail, unlike that species, is coloured like the back and the black tail tip is almost or quite absent.

"Flying Squirrels often collect in numbers within a small area, often in a single tree in fruit, and although they can move about in a tree fairly actively, they do not travel much when a good feeding place has been found. Usually they keep up their peculiar call intermittently through the night, but here they were never heard calling and we were unable to find any of their feeding trees.

Vernacular name.—KUBUNG (Malay, Bankachon)."—G. C. S.

(42) SCIUROPTERUS (HYLOPETES) BELONE, Thos.

Malay Pigmy Flying Squirrel.

1908. *Sciuropterus* (*Hylopetes*) *belone*, Thomas, A.M.N.H., II., p. 305.
♂ 1, Bankachon; ♂ 1, ♀ 1, Tenasserim Village; ♂ 8, ♀ 3, Banlaw.

Sciuropterus belone is very close to *S. spadiceus* from Arakan, and would probably have been lumped with it had Blanford had to deal with it.

"Plentiful in native fruit gardens."—G. C. S.

(43) RATUFA MELANOPEPLA, Miller.

The Tenasserim Giant Squirrel.

(Synonymy in No. 16.)

♂ 1, Victoria Point; ♂ 1, ♀ 2, Bankachon; ♂ 1, ♀ 1, Maliwun, ♂ 1, ♀ 2, Thaget.

I dealt to some extent with the distribution of this species in my last Report. From here southwards it is found (varying somewhat locally) all through the Malay Peninsula and the nearer islands of the Archipelago, the representatives of the genus in Java, Sumatra, and Borneo (with their surrounding islands) belong to other species.

"Fairly plentiful, but more difficult to obtain in thick evergreen jungle than in the deciduous forests further north, as in other places these squirrels evidently get rusty coloured during the hot season.

Weight.—3-4 lbs.

Vernacular name.—TUPAI-NANDONG (Malay, Bankachon)"—G. C. S.

(44) SCIURUS EPOMOPHORUS DAVISONI, Bonh.

The Burmese Epaulet Squirrel.

1891. *Sciurus caniceps*, Blanford, Mammalia No. 249 (partim).
1901. *Sciurus epomophorus davisoni*, Bonhote, A.M.N.H., VII, p. 273.
♂ 4, ♀ 2, Victoria Point; ♂ 16, ♀ 25, in al. 2, Bankachon; ♂ 5, ♀ 5, Tenasserim Village; ♀ 2, Tagoot.

Bonhote in his paper (l.c.) limited the range of *Sc. concolor* to the southern part of the Malay Peninsula, and gave the name of *epomophorus* to the form of it referred to by Blanford as having "the sides of the neck and flanks rufous". In *davisoni* these rufous patches have faded to a "yellowish tinge". The type locality is Bankasun, where it was taken by Davison; the bulk of the present series are therefore topotypes.

"Very plentiful everywhere, both around habitations and in the thickest forest. A thickset rather clumsy looking squirrel. Wherever there are plantations this squirrel destroys large numbers of cocoanuts, by drilling a circular hole in the side and extracting the contents.

Weight.—10-14 ozs.

Vernacular name.—Tupai (Malay, Bankachon)."—G. C. S.

(45) Menetes berdmorei, Blyth.

Berdmore's Squirrel.

1849. *Sciurus berdmorei*, Blyth., J. A. S. B., XVIII, p. 603.
1891. *Sciurus berdmorei*, Blanford, Mammalia No. 258.

♂ 3, Bankachon; ♀ 1, Thaget; ♀ 1, Banlaw.

"This species spends most of its time on the ground, occasionally it may be seen running along railings or up and down slanting or broken bamboos, but never at any distance from the ground. At Bankachon it is said to be often found on the edges of rice fields, around Maliwun it was occasionally seen running across tracks and among long grass, and bamboo scrub, especially in the early evenings, but I have also seen it in the thickest forest. It is very like *Tupaia* in its movements, hiding at the smallest noise and not readily making a second appearance.

Weight.—7¼ ozs.

Vernacular name.—Quuah (Malay, Bankachon)."—G. C. S.

(46) Tamiops macclellandi barbei, Blyth.

The Striped Burmese Squirrel.

(Synonymy in No. 14.)

♂ 21, ♀ 13, Tenasserim Village; ♂ 2, Thaget; ♂ 3, ♀ 11, Banlaw.

"Completely arboreal. I have never observed this species actually on the ground. Common around villages on the Tenasserim River but not observed further south. More plentiful in native fruit gardens than in jungle.

Weight.—1½-2 ozs."—G. C. S.

(47) Hapalomys longicaudatus, Blyth.

Berdmore's Rat.

1859. *Hapalomys longicaudatus*, Blyth, J. A. S. B., XXVIII, p. 296.
1891. *Hapalomys longicaudatus*, Blanford, Mammalia No. 269.

♂ 1, ♀ 1, Bankachon.

This rare rat is distinguished from all other Oriental *Muridæ* by the presence of a triple row of tubercles on the lower molars. It is about the size of *E. rufescens*, has a very long tail, four toes on the front feet, and the great toe of the hind-foot flattened, with a broad flat nail, instead of a claw.

"These specimens were discovered, while hunting for *Chiropodomys* among bamboos. They were found inside hollow bamboos at some distance from the ground. Not plentiful and probably entirely arboreal.

Weight.—♂ $3\frac{1}{4}$ ozs.; ♀ $3\frac{1}{8}$ ozs."—G. C. S.

(48) Chiropodomys peguensis, Blyth.

The Burmese Tufted-tailed Tree Mouse.

1859. *Mus peguensis*, Blyth, J. A. S., XXVIII, p. 295.

1891. *Chiropodomys gliroides*, Blanford, Mammalia No. 271 (partim).
♂ 29, ♀ 21, in al. 4, Bankachon.

Blyth first described a member of this genus, which, from its resemblance to the common European Dormouse, he named *gliroides*. The type, a rather damaged specimen, was from Cherrapunji. Four years later he described *peguensis* from Schwegyen. There are no specimens (other than in spirits) of *gliroides* for comparison. As however Blyth reprinted his description of *gliroides* when giving that of *peguensis* I do not feel justified in ignoring the name *peguensis* which geographically must belong to these specimens although I am unable to specify the differences between the two species. I therefore propose the name *peguensis* for Burmese specimens at least until Assam specimens are available for comparison.

Chiropodomys closely resembles *Vandeleuria*, but is more stoutly built and has the terminal 1-3 of the tail furnished with long hairs almost forming a tuft, and has the hallux and rudimentary pollux armed with a flat nail instead of a claw. Its mammary formula is 0-2-4.

"Very plentiful around Bankachon wherever there were bamboos. They never got into traps, even when set among bamboos, but were easy to find as they hid by day, generally singly, occasionally a female and two young, inside the hollow joints of dead bamboos, through one side of which they had bored a circular entrance, about two inches in diameter.

Weight.—$\frac{1}{2}$-1 oz."—G. C. S.

(49) Epimys surifer, Mill.

The Malay Spiny Rat.

1900. *Mus surifer*, Miller, Proc. Biol. Soc. Wash., XIII, p. 148.

? 1891. *Mus jerdoni*, Blanford, Mammalia No. 279 (partim).
♂ 7, ♀ 12, Victoria Point; ♂ 3, ♀ 1, Victoria Island; ♂ 25, ♀ 24, Bankachon; ♂ 1, ♀ 2, Thaget.

I have entered *Mus jerdoni* of Blanford's Mammalia in the synonymy above, but I very much doubt if Blanford ever saw a specimen of this species. Except somewhat in colour and in its spiny coat *surifer* does not resemble *jerdoni*. It is a large stoutly built rat, with a tail, at most, slightly longer than the head and body. When in new coat it is a bright ochraceous colour, modified a good deal by darker colouring in the back.

"Very plentiful, especially in thick evergreen jungle.

Weight.—4-$5\frac{1}{2}$ ozs., specimens from Victoria Island averaged more, 5-8 ozs."—G. C. S.

(50) Epimys jerdoni, Blyth.

The Bicoloured Rat.

(Synonymy in No. 14.)

♂ 1, Victoria Point; ♂ 1, ♀ 2, Bankachon.

I place these specimens under *jerdoni* pending receipt of topotypes from Sikhim, they agree fairly with the individual placed under this name by Miss Ryley in the Shan State's Report.

(51) Epimys rufescens, Gray.

The Common Indian Rat.

(Synonymy in No. 1.)

Variety with white underparts—

♂ 26, ♀ 22, Victoria Point; ♂ 4, ♀ 2, Victoria Island; ♂ 8, ♀ 7, Bankachon; ♂ 2, ♀ 3, Maliwun; ♂ 6, ♀ 8, Tenasserim Village; ♂ 3, ♀ 3, Thaget; ♂ 14, ♀ 8, Tagoot; ♀ 1, Banlaw.

(*See* also Reports Nos. 5, 6, 7, 9, 10, 11, 13, 14, 15 and 16).

"Plentiful everywhere, particularly around houses or near cultivation. The average tail measurements were considerably less than in specimens from Upper Burma, being often less than that of the head and body (although one or two individuals No. 4392, etc., from Victoria Point—probably recently imported specimens—had tails of the normal length). The mammary formula is not always constant, it not being at all uncommon to find uneven numbers—this irregularity was always noticed in the pectoral mammæ.

Weight.—$3\frac{1}{2}$-$5\frac{3}{4}$ oz.

Vernacular name—Tikos (Malay, Bankachon) (all rats and mice)."—G. C. S.

(52) Epimys concolor, Blyth.

The Little Burmese Rat.

(Synonymy in No. 16.)

♂ 4, ♀ 1, Victoria Point; ♂ 1, ♀ 1, 9 (not sexed) Maliwun. ♂ 2, ♀ 5, Tenasserim Village; ♂ 3, Thaget.

"Plentiful in the township of Maliwun and Victoria Point, apparently not occurring in the forest village of Bankachon. Entirely a house rat.

Weight.—$1\frac{1}{2}$ ozs."—G. C. S.

(53) Epimys vociferans, Mill.

The Long-tailed Malay Spiny Rat.

1900. *Mus vociferans*, Miller, Proc. Biol. Soc. Wash. XIII., p. 138.

♂ 3, ♀ 1, Victoria Island; ♂ 2, ♀ 1, Bankachon.

A large rat, (head and body nine inches) with a very long, bicoloured tail (14 inches). Ochraceous colouring resembling that of *surifer*, fur very much less spiny than in that species.

"Plentiful on Victoria Island, the specimens were trapped on rocky ground, in thick forest, close to running water. Those from Bankachon were obtained in similar situations.

Weight.—9-12 ozs."—G. C. S.

(54) Epimys validus, Miller.

The Large Malay Rat.

? 1891. *Mus bowersi*, Blanford. Mammalia No. 276 (partim).

1900. *Mus validus*, Miller, Proc. Biol. Soc. Wash., XIII, p. 145.

♂ 1, ♀ 1, Thaget.

The type locality is Trong. Though somewhat closely resembling Anderson's *bowersi* externally, it is, as Miller points out, an entirely distinct species, its closest known relative being apparently *infraluteus*, Thos. from Borneo.

Blanford gives Karennee and Tenasserim in the distribution area of *bowersi*, but so far we have no evidence of its having been taken so far south. It is possible the *M. bowersi* taken by Fea were the present animal.

"Occurring in bamboo jungle around Thaget, but apparently not at all plentiful."—G. C. S.

(55) GUNOMYS VARIUS, Thos.

The Malay Mole Rat.

1908. *Gunomys varius*, Thomas, A. M. N. H., XX., p. 204.
1891. *Nesocia bengalensis*, Blanford, Mammalia No. 295 (partim).
♂ 1, ♀ 1, Mergui.

The type locality is Penang.

"Very plentiful on Mergui Island, especially in native bazaars and around stoves."—G. C. S.

(56) RHIZOMYS CINEREUS, Maccl.

The Large Bamboo Rat.

(Synonymy in No. 14.)

♂ 5, ♀ 12, Tenasserim; ♂ 3, ♀ 1, Thaget; ♂ 2, ♀ 2, Banlaw.

"Very plentiful on the Tenasserim River. Always found in bamboo jungle, the roots of which plant they seem to feed on exclusively, and around which they make their burrows. Although frequently burrowing from one clump of bamboo to another, they do not travel to the same extent underground, nor make the same long, mole like, tunnels with frequent mounds of earth, as the smaller species of *Rhizomys*.
Weight.—6-8 lbs.

Vernacular name.—DEKKAN (Malay, Bankachon)."—G. C. S.

(57) ACANTHION BRACHYURUS, L.

The Malay Porcupine.

(Synonymy in No. 16.)

♂ 1, ♀ 1, skull only 1, Bankachon; ♂ 2, Tenasserim.

It seems to me possible, and even probable, that when we obtain authentic specimens of *Hystrix bengalensis*, (there is no specimen in the National Collection) we shall find it is identical with or closely related to the present animal. 'Acanthion' has been generally treated as neuter but this is wrong, the Greek word is masculine.

"Quite plentiful, destructive when they get amongst rubber plantations. The few porcupine earths observed were single burrows, no colonies were found.

Weight.—♂ 32 lbs.; ♀ 27½ lbs.

Vernacular name—LANDAK (Malay, Bankachon)."—G. C. S.

(58) ATHERURUS MACROURUS, L.

The Malay Brush-tailed Porcupine.

1765. *Hystrix macroura*, Linnæus, Syst. Nat., p. 77.
1801. *Hystrix fasciculata*, Shaw, Gen. Zool., II., p. 11.
1891. *Atherura macrura*, Blanford, Mammalia No. 318
♂ 1, Bankachon.

Somewhat resembling the ordinary porcupine, but lacking all signs of a crest, and having a comparatively long tail, ending in a brush or tassel of modified spines.

"Fairly plentiful everywhere, though less so than *Acanthion*. A colony exists in a semi-tame state on Mergui Island, where they are fed and protected by 'Hypongyis'. Apparently quite similar in habits to *Hystrix* and *Acanthion*.

Weight.—9 lbs. (immature).

Vernacular name—LANDAKKECHIL (Malay, Bankachon)."—G. C. S.

(59) TRAGULUS NAPU, F. Cuv.

The Large Malay Chevrotain.

1822. *Moschus napu*, F. Cuvier, Hist. Nat. Mamm., pl. 329.
1891. *Tragulus napu*, Blanford, Mammalia No. 373.

♂ 13, ♀ 11, Bankachon.

Geographically these should be the *T. canescens* of Miller but differ so markedly in several characters from his description that I prefer to retain the older name.

The Malay Chevrotain closely resembles the Indian Chevrotain in form and size, but differs altogether in colour. Above it is a buffy-brown with a well marked black stripe commencing on the crown and running down the back of the neck. Below it is white, with two diverging and broadening dark stripes, which run backwards down the throat till they meet a somewhat paler collar at the base of the throat.

"Practically swarming, equally with *ravus*, in the jungles round Bankachon, but not occurring further north, on the Tenasserim River. They are easily caught in numbers by means of spring snares set in gaps of an artificial 'brake' of cut brushwood, constructed for the purpose. It is however impossible to make a big bag by shooting, as they are so skulking in their movements that it is difficult to get a sight of them without an organised beat. Although chiefly nocturnal, I have occasionally seen animals of both these species crossing a track in the daytime, a thing never witnessed with *meminna*, in Southern India.

The sharp tusks possessed by the males, which are considered to be poisonous by the natives of Java and S. India, are perhaps used as a defence against small carnivores, when caught they did not try to use them however, but merely kicked and struggled like a rabbit. When caught they will often scream like a hare, and frequently died suddenly in their struggles to escape from a net.

The throat gland in both species was always covered with a clear, rather sticky substance, that exuded in small beads, it was however quite odourless. In adults these glands are often much swollen. The female is the heavier.

Weight.—8-12 lbs.

Vernacular name.—NAPU (Malay, Bankachon)."—G. C. S.

(60) TRAGULUS KANCHIL RAVUS, Mill.

The Little Malay Chevrotain.

1891. *Tragulus javanicus*, Blanford, Mammalia No. 372.
1902. *Tragulus ravus*, Miller, Proc. Biol. Soc. Wash., XV., p. 173.

♂ 14, ♀ 9, Bankachon; ♀ 1, Mergui; ♀ 1, Thaget.

Miller's *T. ravus* was based on specimens from Trong. They are distinctly paler than Sumatran specimens but there is considerable variation

in all the characters. I prefer to rank them as a geographical race of *kanchil*.

Blyth's *T. fuscatus* and *T. pelandoc*, based on stuffed specimens without locality, are impossible of determination.

This animal much resembles the last in all but size, *T. napu* being very much the larger.

"Very plentiful round Victoria Point but more local and much less numerous further north, on the Tenasserim River. Identical in habits with *napu*.

Weight.—4-5¾ lbs.

Vernacular name.—PLANDOK (Malay, Bankachon)."—G. C. S.

(61) MUNTIACUS GRANDICORNIS, Lyd.

The Tenasserim Rib-faced Deer.

1891. *Cervulus muntjac*, Blanford, Mammalia No. 362.
1904. *Cervulus muntjac grandicornis*, Lydekker, Field, CIV, p. 780.

♂1, Bankachon; ♂3, ♀2, Tenasserim; ♂3, ♀3, in al. 1, Thaget; ♂2, ♀1, (skull only) Banlaw.

"Plentiful everywhere, but especially so in the bamboo jungles round Thaget."

Vernacular name.—KIJANG (Malay, Bankachon)."—G. C. S.

(62) RUSA UNICOLOR, Bechs.

The Sambhar.

(Synonymy in No. 5.)

♀1, Tenasserim; ♀1, Thaget; ♀, Banlaw.

(*See* also Reports Nos. 11 and 15.)

"In adult Sambhar of both sexes, the lower part of the throat always appears to be bare, while in the centre of this bare area there is a small spot always more or less inflamed. The absence of hair is probably due to the animal rubbing its throat against trees on account of the irritation caused by this curious disease or parasite, it certainly has not the appearance of a gland.

Vernacular name.—RUSA (Malay, Bankachon)."—G. C. S.

(63) RHINOCEROS SUMATRENSIS, Cuv.

The Asiatic Two-horned Rhinoceros.

1817. *Rhinoceros sumatrensis*, Cuv., Regne An. 1, p. 240; Blanford, Mammalia No. 336.
1854. *Rhinoceros crossei*, Gray, P. Z. S., p. 251.
1873. *Ceratorhinus niger*, *C. blythii*, Gray, A. M. N. H., XI, pp. 357-360, pl. XI.

♀ 1, near Bankachon.

"Measurements of sp. 4714, ♀, shot near Bankachon, 17 miles inland from Victoria Point, Southern Tenasserim, 7th January 1914.

(1)	Extreme length—tip of nose—up and down horns to tip of tail	3,265	mm.
(2)	Tip of nose to root of tail—up and down horns ..	2,600	,,
(3)	Tip of nose to root of tail *not* up and down horns ..	2,520	,,
(4)	Length of tail	665	,,

(5)	Hind foot—from hock to tip of longest nail	420	mm.
(6)	Ear	175	,,
(7)	Length of head—tip of nose to between ears—up and down horns	760	,,
(8)	Length of head—tip of nose between ears—*not* up and down horns	680	,,
(9)	Height from shoulder to tip of longest toe	1,440	,,
(10)	Height of withers to tip of longest toe	1,530	,,
(11)	Length of anterior horn—around front curve ..	130	,,
(12)	Girth of neck—half way between head and shoulders..	1,095	,,
(13)	Girth behind shoulders	2,145	,,
(14)	Girth in front of hind quarters	2,290	,,
(15)	Girth of fore foot	550	,,
(16)	Girth of hind foot	538	,,
(17)	Girth of fore leg half way above the knee	565	,,
(18)	Girth of hind leg half way above hock..	525	,,

Iris, dark brown.

Insides of ears, lips, lower throat, and under part around limbs tinged with dull flesh colour.

General colour slate black, although appearing lighter during life owing to a thin and probably permanent coating of dry mud.

Skin folds not very marked though easily felt, particularly on the shoulders. Tail very much compressed laterally at end.

(For full particulars of the shooting of this rhinoceros, see Miscellaneous Note No. VI).

Vernacular name.—KYAN-CHYAW (Burmese), BADAK-RYIA (Malay Bankachon)."—G. C. S.

(64) SUS JUBATUS, Mill.

The Tenasserim Wild Pig.

1891. *Sus cristatus*, Blanford, Mammalia No. 374 (partim).
1906. *Sus jubatus*, Miller, Proc. U. S. Nat. Mus., XXX, p. 746.

♂ 3, ♀ 1, Bankachon.

This undoubtedly represents Miller's *S. jubatus*. The type of that species was from Trong, Lower Siam, but out of 13 specimens examined by him all but two were from Tenasserim. Blanford in his remarks (l.c.) says "According to Blyth the Tenasserim wild pig is a much smaller form than *S. cristatus* of India." The present is no doubt the animal referred to. I can find no specific difference between the 'red' and 'black' specimens. All are immature, and from the material here available the only possible conclusion is that the colour is an age or sex character or partly both.

"Wild pigs are plentiful inland from Victoria Point. Around Maliwun two varieties are recognised both by resident Europeans and Natives.

Vernacular names.—BABI or BABI-UTAN (Malay, Bankachon)."—G. C. S.

SUPPLEMENT.

The following, included in this Collection, belong to the Dry Zone fauna dealt with in the last Report:—

1. FELIS AFFINIS, Gray.

5230, Tagyigin, Gudalin; 5231, Yin, Rani (Dist. Commissioner, Lower Chindwin).

2. Viverra zibetha, L.

5228, Yin. Rani Township (Dist. Commissioner, Lower Chindwin).

3. Paradoxurus hermaphroditus, Pall.

5226, (Dist. Commissioner, Lower Chindwin).

4. Canis indicus, Hodgs.

5227, Kontha Jungle, Yin (Dist. Commissioner, Lower Chindwin).

5. Petaurista candidulus, Wrought.

5205, Paga, Neni (Dist. Commissioner, Lower Chindwin).

6. Ratufa melanopepla, Mill.

5036, Myingyan (D. G. Robertson, I.C.S.).

7. Sus sp.

5232. Skull of an old boar from the District Commissioner, Lower Chindwin. It would be interesting to know if it is indubitably that of a Wild Pig, it seems to show considerable differences from *cristatus* on the one hand and *jubatus* on the other.

The following from the Arakan Yomas and Chin Hills belong to an area from which I hope later we shall obtain collections.

1. *Presbytis phayrei*, Bl., 5037. Arakan Yomas (E. V. Eddis, I. F. S.).
2. *Paradoxurus hermaphroditus*, Pall., 4727, Chin Hills (Capt. W. I. J. Massey).
3. *Mungos urva*, Hodgs., 5254, Chin Hills (Capt. Massey).
5. *Sciurus locroides mearsi*, 4726, no skull, Chin Hills (Capt. Massey).
6. *Epimys spp.*, indeterminable, 4667, 4668, 4669, no skulls, Chin Hills (Capt. Massey).
7. *Rhizomys sp.*, 4666, no skull, Chin Hills (Capt. Murray). This is probably *R. badius*.

The specimen No. 5253 is *Capricornis milne edwardsi*, David. It is from the N. Shan States, 50 miles East of Maymyo and belongs to the fauna dealt with in Report No. 14.

Finally the following are from Central Burma where our Collectors have not yet worked:—

Scotophilus wroughtoni, Thos., 5256, Pyinmana (T. A. Hauxwell, I.F.S.).
Myotis (*Leuconoe*) *adversus*, 5252, Rangoon.
Felis temmincki, Vig. & Horsf., 5255, juv., no skull, Pyinmana.

"Cagri" and "Nul," Hessamara: Subansiri "churs."
Haunts of *Paradoxornis flavirostris*, *Pyctorhis altirostre*, *Pellorneum palustre*, *Drymochares hyperythra*, &c., &c.

Clearance in Virgin Forest, base of Daphla Hills, North Lakhimpur.

NOTES ON THE BIRDS OF UPPER ASSAM.

BY

H. Stevens, M. B. O. U.

Part III with Plate IV.

359. *Crocopus phœnicoptera phœnicoptera* (Lath.) [1271].—Bengal Green Pigeon.

Occurs sparingly in the Dibrugarh district. No records for North Lakhimpur. Specimens secured around Rungagora in December, January, April, June. The plumage of this family is a beautiful example of harmonious blending of diverse colours and an excellent case of protective coloration.

360. *Treron phyarei phayrei* (Blyth.) [1273].—Ashy-headed Green Pigeon.
Osmotreron phayrei, Blanford, F. B. I., Vol. iv., p. 8.
Osmotreron pompadora phayrei, Baker, Indian Pigeons, p. 27.

Very plentiful in the plains; the common Green Pigeon around Rungagora, specimens collected in August, October, December, January. Green Pigeon after the nesting season "flight" in considerable numbers to and from their favourite trees when the berries are ripe. The local sportsmen amongst the planting community take advantage of this habit and take up positions in the open spaces they are wont to pass over particularly at late afternoon and evening; as they fly with great rapidity and dip when leaving and rise when approaching the forest, they afford excellent shooting. Before sunset they delight in roosting amongst the foliage of the topmost branches. So well does their plumage assimilate with their surroundings, it is only with the greatest difficulty they can be located. It is a pleasing sight to hear and see these birds when feeding as they hustle each other for the possession of the coveted berries.

Iris blue, outer ring pale red or pink; orbital skin plumbeous; bill light blue, at base dark; tarsus pinkish-red; claws horny.

361. *Treron bicincta bicincta* (Jerdon.) [1278].—The Orange-breasted Green Pigeon.
Osmotreron bicincta domvillii, Baker, Indian Pigeons, p. 49.

Sparingly distributed in the plains, plentiful at the base of the hills in North Lakhimpur. Specimens collected at Rungagora in June. Dejoo, June and July; North Lakhimpur, April. It has a pleasing low subdued gurgling note. In first week in June numbers would come at morning and evening to a Seleng tree (*Sapium baccatum*) adjacent to bungalow. Iris blue, outer ring pink; bill pale blue; tarsus deep reddish-mauve; claws dark horny blue.

362. *Treron nipalensis* (Hodgs.) [1281].—Thick Billed Green Pigeon.

Occurs at the base of the hills in North Lakhimpur. No records for the Dibrugarh district in the plains. North Lakhimpur, June; Joyhing, May. Iris pink with an inner ring bluish-brown; orbital skin pea-green or emerald green; bill: basal half dark coral red or waxy red, rest of bill pale horny green or greenish-yellow; tarsus, coral red, or lake red; claws horny with dark markings.

363. *Sphenocercus apicauda* (Blyth.) [1283].—Pin-tailed Green Pigeon.
Sphenocercus apicicauda, Blanford, F. B. I., Vol. iv., p. 16.

Plentiful at the base of the hills in North Lakhimpur and commonly occurs in the plains during the cold season. Specimens secured at Rungagora

in February, March (April, 6-4-02, very numerous), June; Dejoo, June, July; Seajuli, November.

Iris blue, outer ring light red or pale brown; orbital skin light purplish-blue or light blue; bill light blue at base, tip greenish-horny; tarsus bright red; claws horny.

364. *Carpophaga ænea* (L.) [1284].—Green Imperial Pigeon.

Plentiful throughout the whole district. Rungagora, December, January; North Lakhimpur, July; Seajuli, November; Silonibari, 14-7-11*, numbers crossing between the forest tracts.

365. *Carpophaga insignis insignis*, Hodgs. [1286].—Hodgson's Imperial Pigeon.

Plentiful at the base of the hills in North Lakhimpur. Specimens secured in June. Large parties frequent their favourite trees when the berries are ripe. Iris greyish-white; orbital skin pale grey; bill fleshy red, horny at tip; tarsus reddish-mauve; soles dull yellow; claws horny.

366. *Chalcophaps indica* (L.) [1291].—Bronze-winged Dove.

Occurs throughout the plains, invariably found near water in forest both in the hills and plains, sometimes occupies secondary scrub growth intersected with dusty paths about which it delights to pick up and forage for different seeds.

Iris brown; bill: basal portion reddish-plumbeous, other portion light vermillion or reddish-horny; orbital skin plumbeous red; tarsus purplish-red or dark red, gradually deepening into plumbeous red at claws, the latter horny.

367. *Columba puniceus*, Blyth. [1302].—Purple Wood Pigeon.

Alsocomus puniceus, Blanford, F. B. I., Vol. iv., p. 38; Baker, Indian Pigeons, p. 176.

Fairly plentiful in the plains, probably locally distributed, occurs at times in small parties in forest. A nest containing a single egg taken out of a low tree on 29-6-03, Rungagora. Parent birds secured, also obtained in November.

Iris greyish-white; orbits grey brown; bill reddish-plum, pale at tip; tarsus and claws purplish-lake; soles whitish-brown.

368. *Streptopelia turtur orientalis* (Latham) [1304].—Rufous Turtle-Dove.

Turtur orientalis, Blanford, F. B. I., Vol. iv., p. 40.

Common throughout the plains, partial to forest clearings, and the forest along the banks of the rivers. Rungagora, December, January; Dejoo, July.

369. *Streptopelia suratensis suratensis* (Gm.) [1307].—Spotted Dove.

Turtur suratensis, Blanford, F. B. I., Vol. iv., p. 43.

Extremely common and familiar everywhere in cultivated tracts.

370. *Streptopelia tranquebarica tranquebarica* (Herm.) [1311].—Red Turtle-Dove.

Œnopopelia tranquebarica, Blanford, F. B. I., Vol. iv., p. 47.

Extremely locally distributed, possibly migratory. The following localities and dates are the only available records:—

Panigaon: Komolabari, North Lakhimpur road, latter end of April 1903, a pair seen. Rungagora, 1-6-04, ♂; 6-6-03, ♂; 7-6-03, ♂; a single occurrence at Dejoo, base of hills, and reported once from Joyhing.

371. *Macropygia tusalia tusalia* (Hodgs.) [1312].—The Bar-tailed Cuckoo Dove.

Descends the gorges of the hills on the north frontier in North Lakhimpur at the cold season, extends into the plains sparingly. One secured

in a forest glade opposite Gurijan, right bank R. Dibru; Rungagora, 26-1-02, ♂; Laluk, Bodutti, North Lakhimpur road, 11-2-10*; Dejoo-Silonibari forest track "putti" near the former place, 12-2-10.*

372. *Pavo cristatus cristatus* Linn. [1324].—Common Peafowl.

Recorded by Blanford as inhabiting the whole Assam valley to Sadiya. In Mangaldai and above Gauhati in Lower Assam apparently yet occurs in fair numbers. Its present status in Upper Assam is very obscure. No reliable records even at second hand. In all probability almost extinct. Mr. J. Lindsay Alexander recollects a pair occupying the precincts of Bordeobam many years ago. This Peafowl is of course well known to the Assamese by their name of "Moir." Should it still exist in Lakhimpur the vast expanses of grass land interspersed with Simal near the Bramapootra and on the Majuli in Sibsagar should be its most likely remaining strong-hold.

373. *Polyplectrum chinquis* (Müller) [1327].—The Grey Peacock-Pheasant.

Extends along the base of the hills on both sides of the valley though only occupies the level land, a very short distance from the hills, where the dense vegetation coupled with the broken ground, afford it all the desired protection. It does not however reach beyond the foot hills nor over the watershed on the hills on the north frontier. Reported at Margerita as extending into the plains on this south side as far as Hookunpukri. In North Lakhimpur occurs as far out as Laluk. Its call may be described by the syllable "hu" rapidly repeated in a loud tone about seven times. They are more frequently heard than seen as it requires infinite patience and toil to get anywhere near them in their almost impenetrable haunts.

374. *Gallus gallus* (L.) [1328].—The Red Jungle-fowl.

Gallus ferrugineus, Blanford, F. B. I., Vol. iv., p. 75.

Plentiful throughout the whole district. In North Lakhimpur its numbers apparently vary with the years. A dry period at the time of nesting seems favourable to an increase in their numbers, specimens secured at Rungagora, March; Dejoo, May, July, October*, November* and December (Young birds secured in July); Gogaldhubie, December: Seaguli, November; Dejoo, 15-5-07*, female with chicks in forest; Komolabari to North Lakhimpur, 19-9-11, hens cackling along this road in the adjacent forest.

375. *Gennæus horsfieldi* (Gray) [1339].—The Black-breasted Kalij Pheasant.

Throughout the whole plains in forest and extends over the watershed in the hills on the North Frontier, Margherita, Rungagora, Dejoo, Beni, Abor-Miri hills, Panchnoi, Daphla hills low elevations. ♂: Iris light brown; orbital skin bright crimson; bill greenish-horny; tarsus slaty grey or bluish-slaty.

376. *Bambusicola fytchii* Anders. [1352].—The Western Bamboo-Partridge.

Occurs above Margherita in the north-east corner of the valley.

377. *Excalfactoria chinensis* (L.) [1354].—The Blue-breasted Quail.

Dejoo, North Lakhimpur, 11-12-07, ♀; 19-4-10*, flushed from low land, August 1910 in heavy grass on roadside; 14-9-10, ♂*; Silonibari, 18-7-11, ♂ ♀*; 6-9-11*, on roadsides; 12-9-11*, adults with two chicks. Somewhat overlooked. Resident as a breeding species, sparingly distributed: the above records are from gardens at the foot of the hills.

378. *Coturnix coromandelicus* (Gm.) [1356].—The Black-breasted Quail.

No specimens secured but a large Quail seen on the following occasions could only have been this species if not *Coturnix coturnix*, L:—

Dejoo, North Lakhimpur, 13-2-08*, two pairs; 17-4-08*; 2-3-10*, single.

379. *Arboricola rufogularis rufogularis* Blyth. [1363].—Blyth's Hill Partridge.

Arboricola rufigularis, Blanford, F. B. I., Vol. iv., p. 126.

Occurs in the Daphla hills and Abor-Miri hills on the North Frontier. Specimens secured in January and February.

Iris red-brown; bill black; tarsus salmon red; claws horny.

380. *Arboricola atrogularis* Blyth. [1365].—The White-cheeked Hill Partridge.

Arboricola atrigularis, Blanford, F. B. I., Vol. iv., p. 127.

Throughout the plains and extends up the lower ranges or foot hills of the Daphla and Miri country on the north frontier. Replaced on the watershed and in the valleys on the north by *A. rufogularis*. Its distribution as given by Blanford, Assam; south of the Bramapootra, is considerably extended.

381. *Francolinus gularis* (Temm.) [1376].—The Swamp Partridge.

"Hoi Koli" Miris of the plains, Assam.

Confined to the "churs" adjacent to and in the beds of the large rivers. Komolabari, Dibrugarh, Gosaigaon; Dunsirimukh, Bramapootra; "cagri" Hessamara, Subansiri. Frequents the heavy grass "chopras" and reeds, and roosts in these latter haunts from about eight to twelve feet from the ground. Bill black; iris crimson; tarsus orange yellow; claws horny.

382. *Turnix pugnax* (Temm.) [1382].—The Bustard Quail.

Resident: commonly occurs throughout the plains. Dejoo, February, April, May, September. Dejoo, February 1909, to be met with in numbers in the short grass along the road sides in the garden. My dogs have become quite experts in ferreting them out, but never manage to catch any. I never remember seeing such a quantity, but it is a plentiful bird at most times. Their eggs are constantly brought in when cultivation is in progress. Iris stone white in birds of the year, 10-8-11.

Numerous clutches of three and four eggs taken in April, May, June and July.

383. *Rallina superciliaris* (Eyton) [1395].—The Banded Crake.

Dejoo, North Lakhimpur, 31-5-10*, this morning a pair of these Crakes were located in a "jan" or stream in the garden. My arrival took them by surprise as they were only a few feet away. One took to wing and settled a short distance off in the water again, whilst the remaining bird scurried along the weeds at the water's edge eventually swimming in true rail fashion when it afforded me a fine display of its upper chestnut coloration. Several attempts to locate this pair later on in the day were made without success. The day previous was very hot, rain had fallen at early morning: perfect ideal conditions for water birds. Not previously recorded for Assam.

384. *Limnobænus fuscus* (L.) [1398].—The Ruddy Crake.

Amaurornis fuscus, Blanford, F. B. I., Vol. iv., p. 170.

Bhimpoora bhil, Gogaldhubie, 11-1-05, ♂, secured at early morning when a dense fog hung over the water in the heavy reeds along the banks of the "bhil"; Dejoo, 22-5-10*, one crossed the road a few yards ahead between some "hoolahs" or swampy recesses in the garden. These two occurrences constitute the only records, probably overlooked owing to its skulking habits. Iris vermillion red; orbital skin salmon red; bill dark olive, upper mandible and tip of lower mandible dark; tarsus salmon red; claws pale horny black.

385. *Amaurornis phœnicura chinensis* (Bodd.) [1401].—The White-breasted Water-hen.

Amaurornis phœnicurus, Blanford, F. B. I., Vol. iv., p. 173.

One of the most common Water-hens, to be found everywhere throughout the plains in marshy or low-lying ground. Clutches of five and six eggs taken in May, June and July. Iris red-brown; bill sap green; frontal shield red or greenish brown; tarsus dark yellow or yellowish-olive; claws horny.

386. *Gallinula chloropus orientalis*, Horsf. [1402].—The Eastern Moor-hen.

Gallinula chloropus, Blanford, F. B. I., Vol. iv., p. 175.

Equally as common as *A. phœnicura*, but is more confined to the open sheets of water "bhils" and streams "jans."

Iris red; bill orange red; tip yellow; tarsus green with a tinge of yellow and red above joint.

387. *Gallicrex cinerea* (Gm.) [1403].—The Water Cock.

Distributed in suitable localities throughout the plains.

Dejoo, 3-12-08, ♀*, actually flushed out of grass on road during a dry spell of weather. *Fulica atra* must undoubtedly occur though I have personally overlooked it.

388. *Porphyrio poliocephala* (Lath.) [1404].—The Purple Moor-hen.

"Kham serai," Assamese.

Specimens collected at Bhimpoora bhil (Gogaldhubie) in North Lakhimpur, no doubt occurs on the most of the large "bhils." Iris red brown; bill reddish horny of various depths; tarsus pale pinkish-horny.

Heliopais personata (Gray) has been recorded in recent years from Upper Assam.

389. *Megalornis antigone antigone* (L.) [1409].—The Sarus.

Grus antigone, Blanford, F. B. I., Vol. iv., p. 188.

Recorded by Blanford "eastward as far as Lakhimpur in Assam." Mr. J. Lindsay Alexander was well acquainted with this crane and the Assamese know it by the name of "Khur-sang". Repeated enquiries and every opportunity made use of on frequent journeys up and down the Subansiri from Dhunsirimukh to Boduti have failed to produce any satisfactory evidence of its occurrence though the "serang" led me to understand it is seen at times on this river's banks.

390. *Sypheotis bengalensis* (Gm.) [1417].—The Bengal Florican.

More plentiful in Lower Assam, several seen near Tezpur, February 1910. In the upper limits of the province confined to the vast expanses of grass land, particularly on the north bank of the Bramapootra in the vicinity of Sadiya (Lali Chopra), one secured at Rungagora, 29-2-04, ♀. Records from Nokhroy, Panitola, Kharjan, but only a very few birds turn up at these localities on odd occasions.

391. *Esacus recurvirostris* (Cuv.) [1419].—The Great Stone Plover.

"*Baligura*," Miris of the plains, Assam.

Confined to the sandy beds of the large rivers in the plains. Rungagora; R. Dibru, rare, 3-12-03, single, 8-2-04, ♀; Hessamara, Subansiri, 7-1-06, ♀; Boduti, 13-1-11, several pairs seen together. Mr. J. L. Alexander found a clutch of two eggs near Derpai on the Subansiri on 23-10-05, which hatched out on 13-11-05. Two clutches of two eggs, each found at Hessamara on the Subansiri, 28-12-05. In one case incubation fresh, in the other inclined to be hard set. This river rises at an earlier period than some of the other rivers which have their source in the nearer ranges probably due to its waters being augmented with the melting snows. This factor may account for the various waders and terns which nest in its bed accommodating them-

selves to these conditions and it is not affected to the same extent with local cold weather rain. Sudden rises are however known at this period and point to rain in its higher limits. At such times a slight increase in its level above its normal cold weather condition plays havoc with nesting birds.

392. *Glareola lactea*, Temm. [1427].—The Small Indian Pratincole.

Commonly occurs on the Runganuddie in North Lakhimpur and no doubt on many of the other rivers. In May it frequents the stony patches in the bed of the river, as it debouches into the plains, for nesting purposes, some seen flying at a high altitude this evening. Dejoo, 14-11-10, a slight rise in the river is quite sufficient to cause a considerable loss of their eggs as they lay their eggs at no great distance from the water. Two birds secured on 8-5-04 contained eggs in oviduct.

393. *Metopidius indica* (Lath.) [1428].—The Bronze-winged Jacana.

Plentifully distributed in all swampy localities throughout the plains.

394. *Hydrophasianus chirurgus* (Scop.) [1429].—The Pheasant-tailed Jacana.

Apparently only locally distributed. Seen and procured at Bhimpoora bhil; Gogaldhubie ; North Lakhimpur, January 1904, a few pairs only. Several seen on a bhil near Komolabari ; Sibsagar, November 1911. 7-1-04, ♂. Iris light brown ; bill and tarsus pale olive green.

395. *Sarcogrammus indica indica* (Bodd.) [1431].—The Red-Wattled Lapwing.

Rungagora, R. Dibru, 5-12-03, ♀. Recorded Journal, B. N. H. Socy., Vol. xv., p. 529. This Plover has not been met with since.

396. *Microsarcops cinereus* (Blyth.) [1434].—The Grey-headed Lapwing.

Confined to a few favoured localities during the cold season. Bhimpoora bhil, Gogaldhubie, specimens secured in December. Kharjan bhil, Dibrugarh.

Iris pinkish-brown ; bill chrome yellow ; terminal half black ; orbital ring and wattle yellow ochreous ; tarsus similar.

397. *Hoplopterus ventralis* (Wagl.) [1435].—The Indian-Spur winged Plover.

Throughout the plains, frequents both the sandy flats of the sluggish rivers in the plains as well as the stony beds of the hill streams when it is only by its loud call and conspicuous black patches of its plumage visible on rising that it betrays its presence ; it has a Lapwing flight. During moonlight nights often to be disturbed from off the roads and open portions of land at some distance from its accustomed haunts when it rises with its usual piercing call. R. Dibru, January ; Bramapootra, Komolabari, September ; Subansiri, Hessamara, January ; Runganuddie, Dejoo, 7-1-11, a single and two pairs at evening. R. Dejoo, higher reaches, two youngsters running amongst the stones early April 1907. Iris dark brown ; bill black ; tarsus dark slate (legs reddish-black ? Jerdon).

398. *Pluvialis dominicus fulvus* (Gm.) [1439].—The Eastern Golden Plover.
Charadrius fulvus, Blanford, F. B. I., Vol. iv., p. 234.

A cold season visitor, immense parties seen at Gogaldhubie, Bhimpoora bhil, remarkably tame, November 1904.

Panitola Polo Ground, 14-1-02, ♂ ; Gogaldhubie, 16-12-05, ♂, ♀ ♀ ; Dejoo, 27-8-05, ♂, one of six which put in an appearance on the "maidan" during a phenomenal wet spell ; 30-9-07 *, five, first appearance ; North Lakhimpur, Polo Ground, 3-10-08 *, several seen in all probability have been down some days, heavy rain at the time.

399. *Charadrius dubius*, Scop. [1447].—The Little Ringed Plover.
Ægialitis dubia, Blanford, F. B. I., Vol. iv., p. 241.

Occurs on all the rivers throughout the plains and on other large sheets of water in the cold season.

R. Dibru, February, March (April, 15-4-03, ♀); Bhimpoora bhil, Gogaldhubie. December: Subansiri, Hessamara, December; Runganuddie, Dejoo, May, 6-5-04, ♂: 31-12-05, ♂. Iris brown; orbital ring yellow; bill black; tarsus dull yellow ochre.

400. *Charadrius placidus*, Gray. [1449].—The Long-billed Ringed Plover.
Ægiatitis placida, Blanford, F. B. I., Vol. iv., p. 244.

Procured on the Dibru, Rungagora, 21-12-01, ♀ ♀.

Runganuddie, Dejoo, 7-7-04, ♂, a most unusual date in the rains; 10-9-08, ♀, 7-1-11, ♂ ♂, others observed at different dates over a period of several years.

Iris brown; orbits yellow; bill black: tarsus pale pinkish-yellow; claws black.

Both these Ringed Plovers are cold season migrants.

401. *Recurvirostra avocetta*, L. [1452].—The Avocete.

R. Dejoo, North Lakhimpur, 7-11-04, ♂. Not recorded by Blanford for Assam. Iris brown; bill black; tarsus slaty blue.

402. *Ibydorhyncha struthersii*, Vigors. [1453].—The Ibis-bill.
Ibidorhynchus struthersi, Blanford, F. B. I., Vol. iv., p. 249.

"Puggah", Hill Miri.

In North Lakhimpur, at the cold season, to be met with in the beds of the hill rivers and streams, as far as the limits of the fast flowing water, as they are partial to the "gagris" or rapids; occur in pairs or small parties of six to eight individuals; when disturbed they go through the jerky neck movements in a similar manner to most waders and utter a loud wild piping whistle before taking flight which possibly only means a short distance covered with expanded wings half skimming and running over the stony ground. On their arrival these Ibis-bills are extremely tame and loath to leave the river bed by doubling back, they generally fly ahead until the upper confined limits of the river are reached when they have to retrace their flight overhead of necessity; they keep however away from the heavily forested banks. Towards the middle of March they recede into the hills, a near approach then is a difficult matter. They are adept swimmers in the shallow rapid water and a wounded bird will endeavour to dive when pressed.

Blanford's remark: "descending almost to the plains in winter" is nearer the mark than Dresser who states "wintering in the mountains in spite of the cold."

R. Dejoo, North Lakhimpur, 4-12-04, ♂ ♂, ♀; Runganuddie, Dejoo, 11-12-04, ♀, ♂; Joyhing, 1-3-09, ♂; R. Dejoo, higher reaches, 18-12-10, ♂, a pair seen; Runganuddie Gorge, 16-2-09 *, a pair; none in evidence on the Runganuddie, 2-4-05; they probably depart the previous month.

R. Dejoo ghaut, mid-day, 31-12-10 *, a pair seen; Sifoo or Sifloo R. Subansiri Gorge, 25-2-06 *, a small party; Borburi Rapids, Subansiri, Gorge, 2-2-06 *, a party of six. Records also from Pathalipam and Derpai on the Subansiri. Dirga R. above Seajuli and Joyhing R.

Iris crimson, also brownish-crimson occasionally; bill deep coral red or purplish-red; tarsus pale lavender mauve shading lighter towards toes, pinkish-grey or mauve tinged ochreous; claws black.

Jerdon's description of the coloration of the soft parts wherever they disagree with those of a competent observer such as Blanford or Godwin

Austen—it is interesting to compare with these—ought to be expunged in a future edition of the Fauna Volumes as they are invariably wrong and misleading.

403. *Numenius arquata* (L.) sub-sp.? [1454].—The Curlew.

Silonibari, North Lakhimpur, 5-9-11, 7-45 a.m., my attention was drawn to the well-known cry of a Curlew overhead. A single bird flying high in a south-westerly direction, sky clear. Commonly seen in the Sunderbuns, Bengal, January 1911.

404. *Tringa hypoleucos*, L. [1460].—The Common Sandpiper.

Totanus hypoleucus, Blanford, F. B. I., Vol. iv., p. 260.

Plentiful along the sandy stretches of the rivers in the plains, although more partial to the stony beds of the hill rivers during the cold season. One record, Runganuddie, North Lakhimpur, 8-5-04, ♂, is a late date.

Iris dark brown; bill greenish plumbeous horny; tarsus greenish-yellow ochre; claws horny.

405. *Tringa glareola*, L. [1461].—The Wood Sandpiper.

Totanus glareola, Blanford, F. B. I., Vol. iv., p. 261.

Never as plentiful as the next Sandpiper, yet commonly occurs in all suitable localities during the cold season.

406. *Tringa ocrophus*, L. [1462].—The Green Sandpiper.

Totanus ochropus, Blanford, F. B. I., Vol. iv., p. 262.

Possibly the commonest Sandpiper. Everywhere abundant in marshy ground. The following dates of arrival and departure are worthy of record:—

7-9-11*, Silonibari, four individuals; again 11-9-11*, a single bird; 17-7-10* Dejoo, single bird in a "hoolah" in the garden.

Iris brown; bill dark olive green or dusky green; blackish at tip; tarsus light olive green or dingy green.

407. *Tringa stagnatilis* (Bechst.). [1463].—The Marsh Sandpiper.

Totanus stagnatilis, Blanford, F. B. I., Vol. iv., p. 263.

This miniature Greenshank has been obtained at Bhimpoora "bhil" in North Lakhimpur in December and January.

408. *Tringa nebularia* (Gunner.). [1466].—The Greenshank.

Totanus glottis, Blanford, F. B. I., Vol. iv., p. 266.

Commonly occurs throughout the cold season alike on marshy ground and along the beds of the rivers, at times in small parties of eight to twelve individuals, in general wary, yet this habit varies with the locality as when located on the "sutis" or backwaters of the sluggish forest rivers are usually easy of approach. Its wild call is quite a distinctive feature of the bird life along the river banks. Dejoo, 24-9-10, single bird, flying very wildly, cold wet morning.

Iris brown; bill dark olive brown, darker at tip; tarsus yellowish green.

409. *Erolia temminckii* (Leisl.) [1474].—Temmincks Stint.

Tringa temmincki, Blanford, F. B. I., Vol. iv., p. 275.

Occurs on all the rivers throughout the plains at the cold season.

R. Dibru, December, January, March (April, 16-4-03, ♂); Subansiri. Hessamara, January; Derpai, February; Runganuddie, Dejoo, January. Iris brown or olive brown; bill olive green, dark towards tip; tarsus olive yellow or olivaceous green; claws black.

410. *Scolopax rusticola*, L. [1482].—The Woodcock.

Occurs sparingly at the cold season in the plains. Gurrung Jan Rungagora, 26-1-02, ♂; Dibrugarh, 21-1-06, ♀; Silonibari, 6-1-10*, camped

this evening against the forest. A woodcock came sailing down from the hills at no great height from the ground and settled in the garden; it had been a cold dreary day and it was too late to institute a search.

411. *Gallinago gallinago gallinago* (L.) [1484].—The Common Snipe. *Gallinago cœlestis*, Blanford, F. B. I., Vol. iv., p. 286.

Rungagora, January, March, April, 6-4-02*; Bhimpoora "bhil", Gogaldhubie, December, January; Dejoo, 20-8-10 *, a single bird flushed from low-lying ground in garden.

Dhoolohat, 12-3-11*, eight put up in the garden at mid-day from one quarter; Silonibari, 25-4-11*, a single bird; 7-9-11 *, 13-9-11*, four large Snipe disturbed time 7-40 a.m. These observation records refer to this Snipe or *Gallinago stenura*. As no birds were secured it is of course impossible to say with certainty which species. At Bhimpoora "bhil" on hot days these birds could almost be knocked over with a stick so lazily do they rise and in such plentiful numbers although, owing to the swampy nature of the ground, they are almost ungetable. The Jack-snipe *Limnocryptes gallinula* has been reported to me on a few occasions. None have been personally obtained.

412. *Gallinago stenura* (Bp.) [1485].—Pin-tailed Snipe.

Dejoo, 28—29-8-05, ♀ ♀ first arrival of half a dozen birds on the maidan in bad wet weather.

R. Dibru, 13—16-3-03, several secured. Numerous records for intermediate dates; occurs in the stony beds of the hill rivers more frequently than *G. gallinago*.

Iris dark brown; bill brown, black at tip of both mandibles; tarsus bluish slate; claws black.

413. *Rostratula capensis* (L.) [1488].—The Painted Snipe.

Resident; as a breeding species at the base of hills in North Lakhimpur.

Dejoo, North Lakhimpur, 13-6-10, this afternoon during a shower of rain a pair of Painted Snipe passed over the road and settled in a "hoolah" on one side. Eggs taken in this quarter in a slight depression on the ground, 24-6-10, clutch of three, 4-7-10, clutch of two, in both cases incubation fresh; Silonibari, 27-7-10, youngster secured.

414. *Larus ichthyaëtus*, Pall. [1489].—The Great Black-headed Gull.

Joyhing, Runganuddie, 12-3-05, three adults in summer plumage, one ♂ and ♀ secured. Iris dark brown; orbital ring waxy crimson; bill deep yellow orange, latter half with a transverse black mark across both mandibles; tarsus dirty chrome yellow.

415. *Larus brunneicephalus*, Jerd. [1491].—The Brown-headed Gull.

Commonly occurs on the Bramapootra.

416. *Sterna seena*, Sykes. [1503].—The Indian River Tern.

Occurs on both the rivers and large "bhils" although absent from the sluggish rivers in the forest tracts. Nests on the Subansiri at Hessamara where eggs have been taken.

417. *Sterna melanogaster*, Temm. [1504].—The Black-bellied Tern.

Similarly distributed as *S. seena*. Bhimpoora bhil, Gogaldhubie, 15-1-05, ♂ 17-12-05, ♀, have the crown and breast to lower tail coverts black. ♂ 15-1-05, has the crown streaked with black and the lower parts white which cases do not agree with Hume who states "the winter plumage is not assumed to December, and is then only retained for about two months," at least so far as these localities are concerned. Eggs taken at Hessamara on the Subansiri.

Iris brown; bill orange yellow, terminal portion dusty; tarsus orange red; claws black.

418. *Pelecanus philippensis*, Gm. [1523].—The Spotted-billed Pelican.

Occurs in any suitable expanse of water, commonly seen on the Bramapootra and other large rivers. Subansiri below Boduti, 13-1-11, numbers in various stages of plumage; Bhimpoora "bhil," North Lakhimpur, specimens also secured near Dibrugarh, 8-12-02, ♀. Buri bhil in forest near Digiltarung, 10-1-04, ♂.

419. *Phalacrocorax carbo* (L.) sub-sp.? [1526].—The Common Cormorant.

Occurs on all the large rivers in the plains although not so commonly as the next *P. fuscicollis*.

R. Dibru, a "suti" or channel five miles below Rungagora, 9-3-02, adult, white patches on sides of head, neck and flanks very prominent. Subansiri below Boduti, 1-3-10, numbers in small parties.

420. *Phalacrocorax fuscicollis*, Steph. [1527].—The Indian Shag.

The common cormorant on all the rivers; at certain times of the year, they roost in immense numbers amongst the rocks in the Gorge of the Subansiri, noted such an occasion, 18-1-06, and Bhimpoora bhil in North Lakhimpur in the cold weather in parts is black with these Water Crows as they are somewhat rightly named by the "Dhoms" or fishermen.

Iris green; gular skin yellow; bill horny, darker on culmen; tarsus black.

421. *Phalacrocorax javanicus* (Horsf.) [1528].—The Little Cormorant.

Similarly distributed throughout the plains although is more frequently seen singly and in small parties.

422. *Plotus melanogaster* (Pennant.) [1529].—The Indian Darter.

More partial to sluggish forest streams and slow flowing rivers than the other Cormorants, but is plentifully distributed over the whole area.

423. *Ibis melanocephalus* (Lath.) [1541].—The White Ibis.

Confined to the low sandy banks of the large rivers. Subansiri below Boduti*, 2-11-07, 13-1-11, noted in small parties on both occasions, commonly occurs farther down the valley. In March 1909 noted as plentiful between Mangaldai and Singrighat on the Bramapootra in parties up to two dozen or thereabouts.

424. *Ciconia nigra* (L.) [1547].—The Black Stork.

Only locally distributed. Two large Black Storks seen on the Dejoo R., 18-12-10, were possibly this Stork, if not *Xenorhynchus asiaticus*, as they would not allow of a near approach, this record is uncertain. Komolabari, 18-11-11*, four seen together in company with several *Dissura episcopus* which were near at hand.

425. *Dissura episcopus* (Bodd.) [1548.]—The White-necked Stork.

Plentifully distributed in all well-watered areas.

426. *Xenorhynchus asiatica* (Lath.) [1549].—The Black-necked Stork.

Occurs on the large rivers in the plains, sluggish forest streams and large expanses of water, although is somewhat locally distributed. R. Dibru, backwater or "suti", five miles below Rungagora, 16-3-03, ♀, one of a small party which had its headquarters hereabouts; Bhimpora bhil, Gogaidhubie, 13-1-05, ♀, 16-12-05, ♂, 23-12-05, ♀; Dhunsirimukh, Bramapootra, 6-12-09, twelve of these storks a short distance below this ghat at scattered intervals; this number is the most ever seen at one time together; 15-1-11*, several pairs in company with Garials on the Bramapootra at close range to the river steamboat; Derpai, 16-1-06,* one rose

from a "pookri" at the foot hills, a favourite haunt of Buffalo. Iris bright yellow; bill black, inside dirty red; tarsus salmon red.

♀, 13-1-05. The gullet of this specimen contained 2 fish 10″ in length. This bird was one of a party of six to eight individuals which frequented Bhimpoora bhil.

427. *Leptoptilus javanica* (Horsf.) [1551].—The Smaller Adjutant.

Sparingly distributed in suitable localities.

Khuddom, North Lakhimpur, 28-11-04, sex undetermined; Bhimpoora "bhil", North Lakhimpur, 19-12-05, ♂; Dejoo, 18-10-08, ♂; 17-11-10*, counted twenty-four this evening flying leisurely in a westerly direction.

L. dubius possibly occurs, although no personal observations available to prove its existence. ♂: Iris pearl white; orbital skin and gular patch continued to ears cabbage red; neck yellow ochre, lower portion cabbage red; bill horny yellowish, dirty at base; tarsus black as if coated with a limy wash.

428. *Ardea purpurea manillensis* (Meyer.) [1554].—The Eastern Purple Heron.

Ardea manillensis, Blanford, F. B. I., Vol. iv., p. 381.

Locally distributed throughout the whole district, frequents the dense reed vegetation along the banks of the sluggish rivers and "bhils" and generally roosts in companies. Iris light yellow: orbital skin yellow green: bill and tarsus yellow, olive and green.

429. *Ardea cinerea*, L. [1555].—The Common Heron.

Plentifully distributed; although frequents the dense reed thickets of the "bhils", is more partial to the open expanses of water and tanks or "pothar" land under water. In the cold season collects in some numbers along the sandy stretches of the large rivers as noted on the Subansiri below Boduti, 13-1-11, left bank in particular. Tinsukia, 20-2-02; Gogaldhubie, 6-1-05, ♂. Iris yellow; orbital skin, gape and cere greenish-yellow; base of upper mandible to beyond nostrils pale blue; lower mandible slightly similarly tinged, remainder of bill dirty yellow; culmen black, yellow line carried to tip under lower mandible; tarsus greenish yellow; claws horny.

430. *Ardea insignis*, Hodgs. [1557].—The Great White-bellied Heron.

Confined principally to the rivers at the base of the hills on the north frontier; during the cold season it extends into the plains, odd birds seen at rare intervals at this period on the Gurrung Jan, right bank river Dibru; Rungagora in heavy forest. the farthest distance from the foot hills that have come under observation although the sandy banks of the Subansiri from Boduti to Dhunsirimukh are invariably also frequented by this Heron at this time, noted on one occasion, 2-11-07. Observed on the upper reaches of the Panchnoi, Daphla hills; Dejoo R., Runganuddie; Dholong R., on several occasions; solitary and wary, seldom taken by surprise excepting when a sharp corner of some of the stony beds of the minor streams is negotiated it is then suddenly disturbed at very close range. This Heron as it stands motionless on a rapid of the fast flowing water when the rivers are in spate and the atmospheric conditions are anything but cheering adds a touch of wildness to the impressive character of its surroundings.

Joyhing, Runganuddie, 3-12-10, ♂. Iris dull ochreous yellow; loral skin, orbital ring and base of lower mandible greenish; bill, upper mandible and inner margin of lower mandible blackish-slaty, tip of lower mandible underneath greenish-ochre, remaining portion mussle grey; tarsus black with horny patches; claws black.

Pathalipam, Subansiri, 19-12-10, ♀, adult. Iris pale ochreous yellow; bill bluish-black, tinged greenish at base, underneath lower mandible pale horn; tarsus and claws black.

431. *Egretta intermedia intermedia* (Wagl.) [1560].—The Smaller Egret.
Herodias intermedia, Blanford, F. B. I., Vol. iv., p. 386.

Specimens secured on the Dibru (March) and at Bhimpora bhil in North Lakhimpur (December) out of large parties, probably is generally distributed. Iris and bill yellow; tip of bill dusky in non-breeding season. *Egretta alba* and *E. garzetta*, both possibly occur but the Egrets have been neglected. *E. garzetta* may also have been overlooked as it can easily be confused with *Bubulcus coromanda* in non-breeding plumage which also is almost pure white though odd specimens at times show a trace of orange-buff markings in particular on the crown; the only safe character whereby the two species may be distinguished when not available for comparison is the bill of the former which is black at all seasons.

432. *Bubulcus coromanda* (Bodd.) [1562].—The Cattle Egret.

Tinsukia, " pothars " (Plains), April, also 31-10-02, ♂, numbers seen stalking over the swampy ground evidently feeding on various *Odonata* with outstretched neck and much flapping of the wings apparently, also with success although a dragonfly on the wing is no easy capture. No doubt other winged insects were also in demand. Specimens in white non-breeding plumage secured in the cold weather at Margherita and Komolabari.

433. *Ardeola grayi* (Sykes) [1565].—The Pond Heron.

Extremely common in low-lying land throughout the plains. These Herons are an excellent example of protective coloration as they squat with closed wings amongst the vegetation; the contrast when they rise and show their white feathers is startling.

434. *Butorides striata javanica* (Horsf.) [1567].—The Little Green Heron.
Butorides javanica, Blanford, F. B. I., Vol. iv., p. 395.

Confined to the banks of the rivers, equally suited to the clear swift flowing waters of the hill rivers or the turbid sluggish rivers in the plains. This little Heron is an adept at crouching amongst the stones and skulking in the dense vegetation although it is anything but wary.

435. *Nycticorax nycticorax nycticorax* (L.) [1568].—The Night Heron.
Nycticorax griseus, Blanford, F. B. I., Vol. iv., p. 397.

Occurs in the vicinity of Dibrugarh at all events, though the fact of not having specimens from other localities is more than likely due to its being overlooked.

436. *Gorsachius* (*Gorsakius*) *melanolopha* (Raffles) [1569].—The Malay Bittern.

Lilabari to Pathalipam (Rajghur), North Lakhimpur, 9-10-07, ♂.

Dejoo (Rajghur), North Lakhimpur, 24-5-08, ♂, (3032), breeding.

Parent bird shot off nest which contained four eggs, average size $2'' \times 1\frac{1}{2}''$, in color dirty yellowy white, hard set, and in one example chipped with the chick on the point of emerging. Nest originally found on the 12-5-08 was placed on the branch of a light tree overhanging a small stream in forest about 20′ in height from the bed of the stream and was a flimsy piled up structure of thin twigs. It was quite impossible to examine the nest without climbing up the tree and at great difficulty lopping off the heavy branch overhanging whilst my man made a feeble attempt at supporting some of the weight with a forked sapling whilst it was gradually drawn towards me. During this time the rain fell in torrents

as only it can during the south-west monsoon in Assam. My plight and mental condition at finding the eggs hard set after all our trouble can be well imagined.

No. 3032. Iris greenish-yellow ; orbital skin bluish-grey ; bill dusky with light edges under the lower mandible ; tarsus greenish-dusky.

437. *Ixobrychus sinensis* (Gm.) [1571].—The Yellow Bittern.
Ardetta sinensis Blanford, F. B. I., Vol. iv., p. 401.

Rungagora, 13-5-01, ♂, 28-5-03 ♂. Iris yellow ; tarsus greenish-yellow. Apparently not as common as *I. cinnamomea*.

438. *Ixobrychus cinnamomea* (Gm.) [1572].—The Chestnut Bittern.
Ardetta cinnamomea, Blanford, F. B. I., Vol. iv., p. 402.

Rungagora, 4-6-03, ♀ ; 25-6-03, ♀ ; 4-8-03, ♂ ; 5-8-0-3 ♂ ; North Lakhimpur, 11-6-04, ♂ ; Gogaldhubie, 13-1-05, ♀. Evidently generally distributed although much more in evidence at the rainy season.

439. *Dupetor flavicollis* (Lath.) [1573].—The Black Bittern.

Equally distributed in all suitable well-watered localities ; commonly seen by day in its retiring haunts. Rungagora, Komolabari, Dejoo.

440. *Botaurus stellaris stellaris* (L.) [1574].—The Bittern.

Dejoo, 11-6-10, a pair of large Bitterns passed overhead this morning to eventually settle in an adjacent "bhil". No specimens have been secured, but this record is most probably referable to this species.

441. *Anser anser* (L.) [1579].—Grey Lag Goose.
Anser ferus, Blanford, F.B.I., Vol. iv., p. 416.

Bramapootra, fifteen miles below Sadiya, 12-3-03, sex ?
" Lali camp, cold season, 1904, sex ?

Tinsukia, 30-10-02, a specimen in flesh sent in by the late Dr. Gregorson. North Lakhimpur, 7-11-08*, a long line of Geese passed over the club house about 5-30 p.m. flying very low in the direction of the Runganuddie, evidently had just dropped down to the plains.

Dejoo, 22-3-10, a dark coloured Goose, flying high, eventually descending in the direction of the Runganuddie, passed overhead, calling at intervals. Subansiri between Bodutti and Dhunsirimukh, 13-1-11, numbers of Geese in evidence ; the orange colour of the tarsus particularly attracted my attention.

Subansiri below Bodutti, 9-11-10, noted a party of about thirty pass slowly down the river.

Some of these records may refer to other species of Geese as my opportunities to secure specimens have been only limited.

The Grey Lag is undoubtedly the Common Goose in Upper Assam. Seen on occasions coming down the Subansiri Gorge, a single, 31-1-06, and has been shot at Pathalipam and Joyhing. The usual difficulty is experienced in getting sportsmen to even preserve the bills and tarsi so that our knowledge of the distribution of these birds increases very slowly.

442. *Sarcidiornis melanotus* (Penn.) [1584].—The Nukta.
Sarcidiornis melanonotus, Blanford, F. B. I., Vol. iv., p. 423.

Komolabari, Sibsagar, 18-11-11, a few Nukta seen hereabouts on a "bhil ;" adjacent to the North Lakhimpur road.

443. *Asarcornis scutulata* (S. Müll.) [1585].—The White-winged Wood-Duck.

Confined to swamps, "bhils," streams in forest, "jans" and "pokris," occasionally occurs in the upper reaches of the hill rivers in North Lakhimpur.

Rungagora, Gurrung Jan ; Paropara Jan. ; R. Dibru, Digiltarung ; Buri bhil, Derpai ; Laluk, 10-4-11*, Joyhing, R. Dejoo, 20-1-09,* four Wood-Duck passed overhead in a corner of the garden adjacent to the "bhils." Dejoo, 10-8-08* ; Rungagora, 23-2-02 ; Gurrung Jan in deep forest. Observed five together, generally seen in singles and in threes. The difference in weight is not confined to one sex, shells similar to what occur at the bottom of the "jans" found in the gullet of one bird. Its call is an unmistakeable long drawn "honk."

Rungagora, 2-02, ♀ ; 10-3-03, ♀, ♂; 17-3-02, ♀, iris orange ; bill dark yellow and freckled with dull dusky spots ; nail light horny ; tarsus orange yellow; claws horny ; 3-4-03, ♂; 5-4-03, ♂ ; bill orange yellow spotted with black ; nail slaty horny streaked dark; tarsus dull yellow with bright yellow spots. 13-1-04, ♂, iris red orange yellow, weight 6 lbs. $5\frac{3}{4}$ oz. 13-1-04, ♀, iris red orange yellow, weight 4 lbs. ; 30-1-04, ♀, weight 3 lbs. 15 oz. ; 30-1-04, ♂, weight 4 lbs. $12\frac{1}{2}$ oz. in poor plumage.

The weight of other males ran as follows : 5 lbs. 10 oz., 5 lbs. 9 oz., 6 lbs. 1 oz.

444. *Æx galericulata* (L.).—The Mandarin Duck.

R. Dibru, two miles below Rungagora, ♀, secured out of a small party of mixed sexes. A single female seen farther down the river the following week was probably a winged bird.

Recorded Journal, B. N. H. Socy., Vol. xiv., p. 626.

The Mandarin Duck, of which the handsome drake is now so well known as an ornamental species, has not again been met with since the above occasion.

445. *Casarca ferruginea* (Pall.) [1588].—The Ruddy Sheldrake.
Casarca rutila, Blanford, F. B. I., Vol. iv., p. 428.

Common on all the large rivers, occasionally occurs on some of the large expanses of water as Bhimpoora bhil in North Lakhimpur. Blanford's notes on the habits of this, the well known Brahminy Duck, could not be improved upon.

446 *Dendrocycna javanica* (Horsf.) [1589].—The Whistling Teal.

Confined to the sluggish rivers, occurs generally in small parties.

447. *Nettopus coromandeliana* (Gm.) [1591].—The Cotton Teal.

Resident : equally distributed in all suitable localities. Mokalbari, Komolabari, Bordeobam, Gogaldhubie ; in the cold season in large parties on the "bhil."

448. *Anas platyrhyncha platyrhyncha* L. [1592].—The Mallard.
Anas boscas, Blanford, F. B. I., Vol. iv., p. 435.

R. Dibru, Rungagora, 16-12-03, ♀ ; Bhimpoora "bhil", Gogaldhubie, 9-1-05, ♀, 8-12-07, ♂.

♀. Iris brown ; bill yellow dappled and stippled with black ; tarsus salmon red.

449. *Anas pœcilorhyncha haringtoni*, Oates [1593 B].—The Burmese Spotted-billed Duck.
Anas pœcilorhyncha, Blanford, F. B. I., Vol. iv., p. 436 (part).

Dibru, suti or backwater, six miles below Rungagora, 14-3-03, ♀, many seen at same time (ten in all counted).

Gogaldhubie, 7-12-05, ♂, others secured on other occasions at Bhimpoora bhil.

Apparently generally distributed, undoubtedly replaces *A. p. pœcilorhyncha* in Upper Assam.

Subansiri, below Bodutti, 13-1-10, numbers seen on right bank.

450. *Eunetta falcata* (Georgi.) [1594].—The Baikal Teal.
Bhimpoora bhil, Gogaldhubie, 8-12-07, ♀, others probably overlooked although the males could hardly be done in a like manner.
♀. Tarsus olivaceous slaty.

451. *Anas strepera*, L. [1595].—The Gadwall.
Chaulelasmus streperus, Blanford, F. B. I., Vol. iv., p. 440.
Cold season, migrant, one of, if not the commonest duck in the district. Bhimpoora bhil, December, January, March. Dejoo, 25-9-10, single, flying overhead. Dejoo, Kopatula Jan, 5-11-08, ♀, in company with a Common Teal ♀ (*Anas crecca*). The Gadwall had been in evidence for some time in the "jans" in garden.

452. *Anas crecca crecca*, L. [1597].—The Common Teal.
Nettium crecca, Blanford, F. B. I., Vol. iv., p. 443.
Rungagora, (October, 14-10-03, ♀), January, March; Bhimpoora "bhil," Gogaldhubie, December, January, February.
Occurs commonly throughout the plains in the cold season.

453. *Anas penelope*, L. [1599].—The Wigeon.
Mareca penelope, Blanford, F. B. I., Vol. iv., p. 445.
North Lakhimpur, 25-3-05, ♂. Possibly occurs frequently on the open rivers though overlooked.

454. *Dafila acuta* (L.) [1600].—The Pintail.
Bhimpoora bhil, Gogaldhubie, December, February; North Lakhimpur, 22-10-10, a party of fifteen flew over the club house at a low elevation. When disturbed Pintail fly very high and keep well out of gunshot range.

455. *Anas querquedula*, L. [1601].—The Garganey.
Querquedula circia, Blanford, F. B. I., Vol. iv., p. 449.
Locally distributed, occurs sparingly at Bhimpoora bhil, North Lakhimpur; this Teal is generally found with *A. crecca* at the edge of the shallow water of this "bhil".

456. *Spatula clypeata* (L.) [1602].—The Shoveller.
Locally distributed, partial to small "bhils" in open country generally; once secured in forest on the Likwa Jan between the Bramapootra and the Dangri R., 7-11-03, ♀; and also on the Subansiri R. opposite Hessamara, 11-4-05, ♂ adult, procured at early morning on the bank, heavy gale the night previous, which may have accounted for this duck in this unaccustomed haunt. Mokalbari, Dibrugarh.

457. *Nyroca rufina* (Pall.) [1604].—The Red-Crested Pochard.
Netta rufina, Blanford, F. B. I., Vol. iv., p. 456.
Bhimpoora bhil, North Lakhimpur, January; Tinsukia, March.

458. *Nyroca ferina ferina* (L.) [1605.]—The Pochard.
Bhimpoora bhil, North Lakhimpur, January.

459. *Nyroca nyroca* (Güld.) [1606.]—The White-eyed Duck.
Nyroca ferruginea, Blanford, F. B. I., Vol. iv., p. 460.
Likwa Jan, Forest between Bramapootra and Dangri R., 7-11-03, ♀; Bhimpoora bhil, North Lakhimpur, December, January.

460. *Nyroca baeri* (Radde.) [1607.]—The Eastern White-eyed Duck.
Bhimpoora bhil, North Lakhimpur, 13-1-05, ♀; 23-12-05, ♀.

461. *Nyroca fuligula* (L.) [1609].—The Tufted Duck.
Tinsukia, cold season, 1902, ♀.

462. *Mergus merganser comatus*, Salvadori [1613].—The Goosander.
Merganser castor, Blanford, Vol. iv., p. 469.

Occurs on all the open large rivers in the cold season.

Bramapootra, Lali Mukh, 6-1-02, ♂.

Subansiri, Hessamara, three miles below, 31-12-05, ♂; on the 28-12-05*. seen to the number of twenty or thereabouts sporting in the river: 7-1-06, ♀; Dhulong Mukh, Subansiri, 14-1-06, ♀; Subansiri Gorge. 26-1-06, ♀; Dejoo, Runganuddie, 1-3-09*, still in evidence. ♂, iris reddish-brown or brown; tarsus bright orange vermillion red, salmon red or pale fleshy red; bill, culmen black, sides of upper mandible rosy pink or dark red.

463. *Colymbus cristatus cristatus*, L. [1615].—The Great Crested Grebe.
Podicipes cristatus, Blanford, F. B. I., Vol. iv., p. 473.

Tinsukia, April 1903, ♀; Bhimpoora bhil, North Lakhimpur, 7-4-05, ♂: Sissi, main channel of Bramapootra, 23-2-08*; seen on the Subansiri at Hessamara, 12 ?-4-05 and reported from Derpai by Mr. J. L. Alexander. This Grebe depends more on its expert diving capacities than its power of flight on the wing when in danger.

464. *Colymbus ruficollis albipennis* (Sharpe) [1617].—The Indian Little Grebe.
Podicipes albipennis, Blanford, F. B. I., Vol. iv., p. 475.

Tinsukia, 21-2-02, ♂; Bhimpoora "bhil," Gogaldhubie, January.

Iris yellow; bill orange yellow; upper mandible horny at tip, at base lemon yellow; tarsus dull green, brown on upper surface.

Calappa Palm (*Actinorhytis calapparia*, W. & Dr.), growing in the Botanic Garden of Peradeniya.

THE PALMS OF BRITISH INDIA AND CEYLON, INDIGENOUS AND INTRODUCED.

BY

E. Blatter, S.J.

Part XIII.

(*With Plates LXXV—LXXIX*).

(*Continued from page 531 of this Volume.*)

ACTINORHYTIS, Wendl. and Dr. Linn., 39 (1875), 184.

(From the Greek "actis," ray, and "rhytis," a fold.)

Bl. Rumph. II, 68, t. 100, fig. 2 (*Areca*)—Mart., Hist. Nat. Palm. III, 313 (*Seaforthia*)—Miq., Fl. Ind., Bat. III, 20 (*Ptychosperma*)—Scheff Ann. Jard. Bot. Buitenz., I, 122, 136, 156, t. 22, 23.— Griff., Palms Brit. Ind., 150, t. 230 B.—Benth. and Hook., Gen. Pl. III, II, 889, 14.

High slender columnar unarmed palms, strongly annulate. Leaves terminal, equally pinnatisect; segments linear-lanceolate, acute, obliquely dentate at the apex, thickened on the margins, recurved at the base; rhachis and plano-convex petiole furfuraceous.

Spadix short-pedunculate with flexuose pendulous branches; spathes 2, complete, complanate, caducous, the lower one elongate, 2-cristate. Flowers monœcious on the same infraroliaceous spadix, the lower ones ternate with the median one female, or the upper ones male, solitary and binate, all with bracts and bracteoles. Male flowers minute, asymmetrical. Sepals orbicular, compressed-carinate, concave, broadly imbricate. Petals 3, ovate, thickly coriaceous, subequal, valvate. Stamens 24-30. Female flowers much larger, ovoid. Sepals 3, reniform rotundate, broadly imbricate. Petals slightly longer.

Fruit large, roundish-elliptic; remains on stigma vertical; pericarp thick fibrous. Seed large, round, or elliptic; raphe densely branched; albumen ruminate.

Species.—1.

Distribution.—Malay Archipelago.

ACTINORHYTIS CALAPPARIA, W. & Dr. in Linnæa, XXXIX (1875), 184.—*Pinanga calapparia*, Rumph. Amb., I, 28. Valent. Amb., III, 185.—*Areca calapparia*, Bl. Rumph., II, 68, t. 100, fig. 2.—*Seaforthia calapparia*, Mart., Hist. Nat. Palm, III, 313.—*Ptychosperma calapparia*, Miq. Fl., Bat., III, 20.—*Areca cocoides*, Griff., Calc. Journ. Nat. Hist., V, 454. Palms Brit. Ind., 150, t. 230 B.

NAME.—Pinang Punowun (Malay); Calappa Palm (English).

DESCRIPTION.—Stem 40 feet high; crown dark green, ample. Leaves pinnate; petiole scurfy, plano-convex; lamma 8-9 feet long, 4-4½ broad, in outline lanceolate-acuminate; pinnæ 2 feet long, 1¼-1½ inches broad, linear, acuminate, unequally bipartite shining, very smooth, uppermost inequilateral, sub-erose at the top; central vein and 5 others forming as many heels above, the central underneath bearing scales attached by the base.

Spadix ascending altogether green, branches stiff, stout, above flexuose-torulose owing to niches in which the flowers are lodged. Spathes 2. Lower flowers: 1 female between 2 males, upper males in pairs. Male flowers small; sepals imbricate, carinate, hard, much shorter than the corolla, margins sub-membranous, denticulate, inner rather the longest. Corolla valvate, hard, tripartite to the base; petals oblong-lanceolate, sub-obtuse. Stamens 24-30, in bundles, anthers linear-sagittate, pistillode small, subulate or none. Female flowers: sepals and petals imbricate with very broad bases. Staminodes 3 or none. Ovary large, white, oblong, 1-celled, sub-compressed, divided at the apex into 3-cuneate, subrecurved lobes, each with a line of stigmatic tissue along the central line of the inner face; ovule 1, attached nearly along its whole length.

Fruiting spadix spreading; branches angular, thickened at the base. Fruit pendulous from its weight, ovate, size of a duck's egg, surrounded at the base by the perianth, at the apex presenting the 3 styles; colour orange-yellow; pericarp thick, firm, of yellow cellular tissue and longitudinal fibres, which are more numerous towards the putamen. Putamen thin, hard, crustaceous. Seed 1, erect; tegument thin, shining, light brown; albumen densely horny, much ruminate; embryo basilar.

HABITAT.—Malay Archipelago.

ILLUSTRATION.—Plate LXXV shows a fully developed specimen of the *Calappa Palm* growing in the Botanic Garden of Peradeniya. At the base of the leaf-sheaths an unexpanded spadix may be seen whilst a little lower down at least four fruiting spadices are visible. The photograph was taken by Mr. Macmillan.

PTYCHORAPHIS, Becc., Males, I, 53, cf. Beccari in Ann. Jard. Bot. Buit., II, 90; Males, III, 109; Webbia, I (1905), p. 327.

(From the Greek "ptychos," folded, wrinkled, and "raphis," needle, pin.)

Stem slender, annulate. Leaves pinnatisect, leaflets narrow, caudate-acuminate.

Spathes 2, complete, caducous. Spadix infrafoliar, paniculately branched. Flowers spirally disposed, male only towards the tips of

Ptychoraphis augusta, Becc.

the branches, a female between 2 males towards the base. Male flowers symmetric; sepals suborbicular; petals valvate; stamens 6; anthers versatile; pistillode conical or columnar. Female flowers bibracteolate; sepals rounded, concave; petals longer, tips valvate; stamens 4-6; ovary ovoid; stigmas 3, triangular, acute; ovule parietal.

Fruit small, ovoid, stigmas terminal. Seed ovoid, obtuse, deeply grooved along the long, linear hilum, albumen deeply ruminate; embryo basilar, oblong.

SPECIES.—3, Malayan.

Leaflets 2-3 feet long	...	...	*P. augusta.*
Leaflets about 1 foot long	...	...	*P. singaporensis.*

PTYCHORAPHIS AUGUSTA, Becc., in Ann. Jard. Bot. Buitenz., II, 90; Males, III, 110.—*Areca augusta*, Kurz., in Journ. Bot., 1875, 331, t. 170.

DESCRIPTION.—Trunk very tall, 80-100 feet high, 1 foot in diameter. Leaves 8-12 feet long; leaflets numerous, 2-3 feet long, sessile, narrowly linear, acuminate, 3-costate; petiole very short; rhachis flat above, furfuraceously tomentose.

Spadix decompound, $2\frac{1}{2}$-$3\frac{1}{2}$ feet long. Male flowers: bracts broad, smooth; sepals broadly ovate; petals oblong, obtuse. Female flowers: sepals and petals nearly alike, concave, imbricate.

Fruit 1 inch long, elliptic-oblong, scarlet. Seed oblong.

HABITAT.—Nicobar Islands, frequent, in woods in Kamorta.

ILLUSTRATION.—We reproduce on Plate LXXVI a midde-sized specimen of *Ptychoraphis augusta.*

The right side of the background is occupied by a grove of coco-nut palms. We have to thank Major Gage for the photograph.

PTYCHORAPHIS SINGAPORENSIS, Becc., in Ann. Jard. Bot. Buitenz., II, 90, t. 196; Males, III, 109; Hook, Fl. Brit. Ind., VI, 413; Ridley, Fl. Malay Penins., II, 148.—*Ptychosperma singaporensis*, Becc., Males I, 61.—*Rhopaloblaste singaporensis*, Hook, f. in Gen. Pl. III, 892.—*Drymophloeus singaporensis*, Hook., f. Kew Gard. Rep. (1882) 1884, 55.

NAMES.—In Singapore: Rintin, Kerintin. German: Singapore-Runzel-Areka.

DESCRIPTION.—Stem slender, 6-12 feet high, $1\frac{1}{2}$ inch in diameter, soboliferous, black, ringed.

Leaves pinnate; petiole nearly 3 feet long, blade 4 feet, leaflets very many, alternate, narrow linear acuminate, 8-12 inches long, $\frac{1}{2}$ inch wide, 3-nerved, upper shorter, midrib beneath scaly; rhachis scurfy.

Spadix slender, deflexed, about 1 foot long, about 5-7 branched from the base; spikes moderately slender, $\frac{1}{8}$ inch thick, rhachis olive green (according to Ridley), rusty furfuraceous (according to Fl.

Brit. Ind.). Spathes sword-shaped, apex rounded, convex outside, broadly channelled inside, winged, inner spathe shorter, narrower, not winged, woolly. Flowers in pairs numerous and close, a male and a female together, or females only at base, males at tip. Male flowers: sepals ovate orbicular, petals larger, ovate, acute, $\frac{1}{8}$ inch long, white or yellow. Stamens 6, filiform, white; anthers small, oblong, dorsifixed. Pistillode large, conic. Female flowers with a transversely oblong bract. Sepals ovate, truncate, gibbous, green, petals shorter, ovate, acute, green. Pistil obovoid. Stigmas minute, triangular.

Drupe nearly $\frac{2}{3}$ inch long by $\frac{1}{4}$ inch in diameter, ovoid or elliptic-ovoid, red, pulpy, tip conical, slightly excentric. Seed free, elliptic-ovoid, rounded at both ends, $\frac{3}{8}$ inch long, grooved on one face, branches or raphe descending to the base; albumen ruminate.

HABITAT.—Singapore: Sanglin, Sungei Buluh, Chan Chu Kang, Toas, Kranji; Johor: Gunong Pulai; Dindings: Sumut (ex Ridley) . . . . cultivated in India.

USES.—The stems which are quite black make beautiful walking sticks (Ridley).

DICTYOSPERMA, Wendl. & Drude Linn., 39, 181.

(From the Greek "dictyon," a net, and "sperma," seed; in allusion to the raphe of the seed forming a loose network).

Mart., Hist. Nat. Palm, III, 175, t. 154, fig. 2, 3 (*Areca*)—Baker, Fl. Maurit., 383.—Scheff., Natuurk. Tijdsch. Ned. Ind., 32, 183 (*Ptychosperma album*)—Benth. & Hook, Gen. Pl. III, II, 890, 1.

Unarmed, of moderate height; leaves equally pinnate; petiole with a complete basal sheath; pinnæ strongly reduplicate at the base, 1-nerved; with a few scales beneath; the terminal pinnæ confluent.

Monœcious. Flowers in spirally disposed 3-flowered clusters on the branches of a simply subfastigiately branched spadix, the female flower between and below two males. Male flowers: inner segments of perianth valvate, thickened, ovate-oblong, acute; stamens 6, included; pistillode a terete column, shorter than the stamens. Female flowers: segments of perianth imbricate; staminodes forming a ring with 6 linear teeth.

Fruit olive-like, persistent; scar of the stigma exactly apical; mesocarp fibrous; endocarp slender, crustaceous. Seed attached to the endocarp on one side throughout its whole length; raphe forming a loose network; albumen ruminate; embryo subbasilar.

SPECIES.—3.

DISTRIBUTION.—Mascarine Islands.

CULTIVATION IN EUROPE.—Stove palms. A compost of loam, peat, and leaf soil, in equal parts, with a liberal addition of sand

Dictyosperma Album, Wendl. *var. aureum* Balf. f., in the Sibpur Botanic Gardens.

suits them very well; loam should preponderate to the extent of about two-thirds; when fully developed, some rotten cow-manure may be added with advantage. The seeds should be sown in a similar compost and kept in a moist, gentle heat. The greatest enemy of this palm is dry warm air. Dammer has found that the plants do quite well in a cool room during winter. Young specimens get easier accustomed to the air of a room than older ones. They require much water. The Dictyospermas are great favourites on account of the beautiful colouring (red, yellow) of the leaf-stalks and nerves.

DICTYOSPERMA ALBUM, Wendl., in Linnæa XXXIX, 181; Balf., f. in Baker. Fl. Maurit & Peych, 384. Drude Palmæ, 75.—*Areca alba*, Bory Voy., I, 306; Willd., Spec. Pl. IV, 596, n. 8; Poir, Encycl. Suppl. I., 441, n. 9; Spreng, Syst. Veg., II, 139, n 7; Mart., Hist. Nat. Palm, III, 175, t. 154, 155, fig. 2.—*Areca borbonica*, Hort.—*Sublimia palmicaulis*, Commers. Mss.—*Ptychosperma album*, Scheff., Natuurk. Tijdsch. Ned. Ind., 32, 183.

NAMES.—Weisser Netzsame (German).
Palmiste blanc, Palmiste commun (French).

DESCRIPTION.—A very variable plant. Stem 40-50 feet high, 8-9 inches in diameter, dilated at the base. Leaves 8-12 feet long; petiole semiterete, 6-18 inches long, grooved down the face; leaflets 2½-3 feet long, 2-3 inches broad, lanceolate, acuminate cuneate at the base, widely reduplicate, with one prominent median nerve, and 3 lateral, secondary nerves on each side, all bearing a few medially attached scales, especially towards the base of the leaflets; veins and margins of leaflets green or reddish.

Spadix 2 feet long, with a very short, often tomentose peduncle; branches erect or slightly reflexed, 6-18 inches long, very zigzag when young; flowers often distichous at the base of the branches; spathes 1-1½ foot long. Inner segments of male perianth ¼ inch long, three times as long as the outer.

Fruit ovoid-oblong, pointed, about ½ inch long, purplish.

HABITAT.—Mauritius, common; Seychelles, not indigenous, Bourbon.

DICTYOSPERMA ALBUM, Wendl., *var. aureum*, Balf. fil. in Baker Fl. Maurit. and Seych., 384—*Areca aurea*, Hort.

NAMES.—Goldfarbiger Netzsame (German).
Palmiste bon (French).

DESCRIPTION.—Stem about 30 feet high, smaller and more slender than in the type.

Leaves 4-8 feet long; petiole 8 inches long; leaf-sheath 1-2 feet long; pinnæ 1½-2 feet long, 1 inch broad; secondary veins scarcely visible.

Branches of the spadix rigidly erect, 9-11 inches long. Flowers half the size of those of the type.

Fruit cylindrico-conic, $\frac{2}{3}$-$\frac{3}{4}$ inches long. Young plants bright orange.

HABITAT.—Rodriguez, common.

ILLUSTRATION.—The beautiful specimen of *Dictyosperma album*, var. *aureum* reproduced on Plate LXXVII, grows in the Sibpur Botanic Gardens, and its photograph was kindly supplied by Major Gage.

ARCHONTOPHŒNIX, Wendl. & Drude, in Linnæa, XXXIX, 182, 190, 211, t. 3, f. 6.

(Etym : From the Greek "archon", ruler, king, and "phœnix", palm, in allusion to their majestic aspect and their relationship.)

Mart., Hist. Nat. Palm, II, 181 (non. t. 105, 106, 109 uti habent, Benth. & Hook, Gen. Pl.).—F. Mueller, Frag. Phyt. Austr., V, 47, t. 43, 44 (*Ptychosperma*).—Benth., Fl. Austr., VII, 141 (*Ptychosperma*, sp. n. 2, 3).—Bot. Mag., t. 4961 (*Seaforthia*, excl. fig. 9, 10 11).—Benth. & Hook, Gen. Pl. III, II, 889, 15.—Bailey, Queensl. Fl., V, 1674.

Stem high and slender, columnar, unarmed, strongly annulate. Leaves terminal, equally pinnatisect, forming a dense crown; segments linear-lanceolate, acuminate, or bidentate at the apex, the margins recurved at the base; rhachis convex on the back, carinate on the upper side; petiole canaliculate on the upper side; sheath elongate, cylindric.

Spadices shortly pedunculate, thrice divided, branches and branchlets flexuose, slender, pendulous, glabrous; spathes 2, complete, elongate, complanate, caducous; bracts semilunar; bracteoles persistent. Flowers monœcious, spirally arranged, ternate, the median one female, or solitary and binate males, bracteate and obscurely bracteolate. Male flowers asymmetrical. Sepals 3, small, triangular, rotundate, carinate, imbricate. Petals 3, obliquely ovate-oblong, subacute, valvate. Stamens 9-24; filaments slender, connate at the base, inflexed at the apex; anthers linear, bifid at the base, dorsifixed, versatile. Pistillode styliform. Female flowers smaller than the male, subglobose. Sepals 3, orbicular, convolute-imbricate. Petals similar, but smaller. Staminodes 6, subulate, or ovary trigonous-ovoid, 1-locular; stigmas 3, minute, recurved; ovule parietal.

Fruit small, globose-ellipsoid, umbonate by the subterminal stigmas; pericarp fibrous; endocarp very thin. Seed erect, closely adhering to the endocarp, smooth; hilum lateral, elongate; branches or raphe reticulate; albumen deeply ruminate; embryo basilar.

SPECIES:—4.

DISTRIBUTION.—Tropical and subtropical, East Australia.

Alexandra Palm (*Archontophœnix Alexandræ*, W. & Dr.).

CULTIVATION IN EUROPE.—A genus of elegant stove palms. The species thrive best in fibrous loam, leaf mould, and sand. Thorough drainage and an abundant supply of water are important points in their culture. Propagation is effected by seeds.

Leaf-segments glaucous on the underside ... *A. alexandræ.*
Leaf-segments green on both sides ... ... *A. cunninghamii.*

ARCHONTOPHŒNIX ALEXANDRÆ, W. & Dr., in Linnæa, XXXXIX, 212 ; Bailey, Queensl. Fl., V, 1675—*Ptychosperma alexandræ,* F. Muell, Fragm. Phyt. Austr., V, 47, 213, t. 43, 44; Benth., Fl. Austr., VII., 140.

NAMES.—Alexandra Palm (English.)
Alexandra Herrscherpalme (German).

DESCRIPTION.—A tall palm, stem attaining 70-80 feet. Leaves several feet long; rhachis very broad and thick, glabrous or slightly scurfy; segments numerous, the longer ones 1½ foot long, ½-1 inch broad, acuminate and entire or slightly notched, green above, ashy-glaucous or white underneath.

Spathe 1½ foot long. Panicle when open above 1 foot long and broad; much branched, the rhachis more or less angular and flexuose, the notches scarcely immersed. Male perianth 2-3 lines long; the inner segments very often oblique, pale coloured; the outer segments about 1 line long, slightly imbricate. Stamens usually 9 or 10, but varying from 6-14; filaments very short. Female perianth about 2 lines long, the segments all broad, and about equal in length.

Fruit ovoid globular, 7-9 lines long.

HABITAT.—Queensland: Rockingham Bay, Mackay, and many other tropical localities (Bailey).

ILLUSTRATION.—Plate LXXVIII represents two elegant, slender stemmed specimens of the Alexandra Palm. Photograph by Mr. Macmillan in the Botanic Garden of Peradeniya.

ARCHONTOPHŒNIX CUNNINGHAMII, Wendl. & Drude, in Linnæ, XXXIX, 214 ; Bailey, Queensl. Fl., V, 1675—*Seaforthia elegans,* Hook, Bot. Mag. No. 4961, excl. fig. 9, 10, 11 (not of R. Br.)—*Ptychosperma Cunninghamii,* Wendl. & Drude, in Bot. Zeitz. (1858), 346; Benth., Fl. Austr., VII, 140.

NAMES.—English: Cunningham's Seaforthia.
German: Cunningham's Herrscherpalme.

DESCRIPTION.—Stem attaining a height of 60 feet, erect, slender, annulate, dark green, almost glossy, crowned with a spreading tuft of beautifully pinnate leaves. Leaves 8-10 feet long, petioles sheathed at the base. Leaflets numerous, narrow-lanceolate, spreading, 1-1½ foot long, several of them unequally bifid at the apex, one segment being much longer than the rest.

Spadices below the bases of the leaves, fleshy, dull pale-lilac, each surrounded by 2 spathes, drooping, much-branched. Flowers many scattered, some male, some female. Anthers of male flowers rather oval-oblong than linear. Female flowers with the rudiments of 6 stamens at the base.

Fruit like *A. alexandræ.*

HABITAT.—Queensland: Sunday Island; Rockhampton; N. S. Wales: Illawarra, Woolongong.

ILLUSTRATION.—Visitors to Bombay will at once recognize the spot in which the palms shown on Plate LXXIX is growing. We wish to draw attention to the dense fruiting spadices arising from the base of the leaf-sheath. Mr. Phipson has personally taken the photograph.

(*To be continued.*)

Cunningham's Seaforthia (*Archontophœnix Cunninghamii*, W. & Dr.).

LIST OF THE BIRDS OF BALUCHISTAN.

By

Lt.-Col. H. Delme Radcliffe, F.Z.S.

(Royal Welch Fusiliers).

Compiled with reference to the Fauna of British India "Birds" by Oates and Blanford. The number in brackets after the English name is that of the species in the Fauna.

There is no doubt that more species will be added to this list in future, especially amongst the warblers, chats, wagtails, larks, swifts, owls, and hawks of which this I am sure does not give a complete list. Additions too will be made among the plovers, gulls and other sea-birds from the coasts of Baluchistan.

Family: Corvidæ.

1. *Corvus corax.*—The Raven. [1].

Very common at all seasons. Many frequent the Cantonments at Quetta. This species breeds in the Baluchistan Mountains. Capt. (now Lt.-Col.) Marshall, Royal Garrison Artillery, in his Notes mentions that he found a nest with fresh eggs on March 24th. I saw half-fledged young birds near Killa Abdullah and Shela Bagh in May 1912. There are several specimens in MacMahon Museum at Quetta.

2. *Corvus umbrinus* —The Brown-necked Raven. [2].

Common in the Quetta Valley during the winter months, though I never observed this species in summer. I obtained a fine male specimen at Samungli near Quetta on November 14th, 1911, and presented the skin to the Bombay Natural History Society, and shot another good specimen in my garden in Quetta in November 1913.

3. *Corvus frugilegus.*—The Rook. [5].

Frequents the Quetta Valley in flocks during the cold months of winter, but I never observed it in summer. It certainly does not breed in Baluchistan. There are two specimens in the MacMahon Museum at Quetta.

4. *Corvus monedula.*—The Jackdaw. [9].

I have occasionally observed this species in cold winter months, intermingled with the flocks of Rooks frequenting the Quetta Valley, but never observed it at any other time of year. There is a specimen of this species in the MacMahon Museum at Quetta.

5. *Pica rustica.*—The Magpie.

Common in Baluchistan at all seasons, specially in the higher valleys, where it breeds. It is very common at Ziarat, 8,000 feet above sea-level and breeds in the Juniper Forest there. Marshall mentions finding a nest with 3 fresh eggs on May 15th. In winter it comes down to the Quetta Valley, and I have seen a few in Cantonments there. I shot a fine male specimen at Ziarat in June 1912. There is one specimen shot at Pishin, in the MacMahon Museum at Quetta.

6. *Graculus eremita.*—The Red-billed Chough. [29].

This species frequents the Quetta Valley in flocks in the cold winter months. In summer it is only found in the higher mountains. Nests with

young were found on Peel Mountain near Kach in May 1913 by Lieut. Shepheard, Essex Regiment, when the Regiment was in Camp near Kach for training. There are 3 specimens of this species in the MacMahon Museum at Quetta. I have been told that the yellow-billed Chough has been observed in Baluchistan, but this requires confirmation. No specimen has to my knowledge been obtained.

7. *Parus atriceps.*—The Indian Grey Tit. [31].
Common in summer in the higher mountains of Baluchistan, where it breeds. I saw many young birds in the nesting plumage at Ziarat in June and July. In winter it is common in the Quetta Valley, frequenting the gardens and orchards. There is a specimen of this species in the MacMahon Museum at Quetta.

8. *Ægithaliscus leucogenys.*—The White-cheeked Tit. [37].
Common in the higher mountains of Baluchistan in summer. I saw many young birds in nestling-plumage in June and July at Ziarat, and obtained one specimen. I never observed it in the Quetta Valley.

9. *Lophophanes melanolophus.*—The Crested Black Tit. [44].
Common at Ziarat in summer, and breeds there. I saw many young birds in nestling plumage in June and July. I obtained 2 specimens, one in adult, and one in nestling plumage at Ziarat in June 1912. I never observed it in the Quetta Valley.

Crateropodidæ.

10. *Trochalopterum lineatum.*—The Himalayan Streaked Laughing Thrush. [99].
Frequents the bushy nullahs in the higher mountain valleys near Ziarat, though not in large numbers. I obtained a specimen, which I presented to the MacMahon Museum at Quetta, in June 1912, near Ziarat, and I feel sure that it breeds there.

11. *Myiophoneus temmincki.*—The Himalayan Whistling Thrush. [187].
Frequents the mountain streams in Baluchistan, and undoubtedly breeds in their neighbourhood. I saw a pair, which must have been nesting close by, several times in the Sandeman Tangi near Ziarat. Several were shot in 1913 by Capt. Meinertzhagen, Royal Fusiliers, and 3 of his specimens are in the MacMahon Museum at Quetta.

12. *Molpastes leucotis.*—The White-eared Bulbul. [285].
Frequents the gardens and orchards in the Quetta Valley during summer, but not in large numbers. I think it certainly breeds there. It stays fairly late in the year, and I obtained a specimen in my garden in Quetta in November 1913. There are two specimens of this species in the MacMahon Museum in Quetta. I believe this species migrates to lower valleys, perhaps even to the plains of Sindh, during January, February and March. It appears to return in April.

Sittidæ.

13. *Sitta tephronota.*—The Eastern Rock Nuthatch. [322].
Very common about the valleys of Baluchistan, where there are running streams, and these birds build their curiously-shaped nests of mud against the rock-faces, and stick feathers, often of bright colours, on the outside.

apparently for ornament. I found many of these nests in the Hanna Valley, shaped like a large ball, with a tube leading into it. The birds build up the mud, when quite soft, and when sun-dried it gets like a sun-dried brick. I obtained one specimen near Urak in April 1913.

Certhiidæ.

14. *Certhia himalayana.*—The Himalayan Tree-Creeper. [341].

Common at Ziarat, at 8,000 ft. and more, and it certainly breeds there in the Juniper Forest. I saw birds in nestling plumage there in July. I have also seen this species in the Quetta Valley in winter.

15. *Tichodroma muraria.*—The Wall-Creeper. [348].

Found throughout Baluchistan in the mountains, wherever there are rocky wall-faces, and it must, I think, breed there. Several specimens were shot in 1913 in the mountains near Quetta by Captain Meinertzhagen, Royal Fusiliers. There are two specimens of this species in the MacMahon Museum at Quetta.

Sylviidæ.

16. *Acrocephalus stentoreus.*—The Indian Great Reed-Warbler. [363].

Not uncommon in the Quetta Valley along the bed of the Lora River, where it also probably breeds. I obtained a specimen in young plumage in my garden in Quetta in August 1913.

17. *Lusciniola melanopogon.*—The Moustached Sedge-Warbler. [377].

I have never personally observed this species in Baluchistan, but one was shot in 1913 by Captain Meinertzhagen, Royal Fusiliers, and I saw this specimen in the MacMahon Museum at Quetta.

18. *Hypolais rama.*—Sykes' Tree-Warbler. [394].

Fairly common in the Quetta Valley in summer, and it breeds there in gardens and plantations. I found several nests and took one with 4 eggs on June 5th, 1913, in the Galbraith Spinney near Quetta. I also shot the cock bird, and sent the skin to the Bombay Natural History Society. This species migrated to the plains during winter. The nests are pretty little cups placed low down in bushes, often in a rose-bush or tamarisk bush.

19. *Sylvia jerdoni.*—The Eastern Orphean-Warbler. [399].

I found a small colony of this species near Kahan on the road from Kach to Ziarat, on July 10th, 1913, and obtained one specimen, which I sent to the Bombay Natural History Society. I think this species must breed in the locality mentioned. It has a very sweet and powerful song.

20. *Sylvia minuscula.*—The Small White-throated Warbler. [403].

I have not personally observed this species in Baluchistan, but Marshall speaks of small flocks of these birds occurring on migration in April. There is one specimen, said to be of this species, in the MacMahon Museum at Quetta.

21. *Phylloscopus tristis.*—The Brown Willow Warbler. [407].

I have never personally observed this species in Baluchistan, but Marshall states that he shot one in February in his garden, and there are

three specimens, said to be of this species, in the MacMahon Museum at Quetta.

22. *Phylloscopus indicus*—The Olivaceous Willow Warbler. [408].

Fairly common in the neighbourhood of Ziarat, at 8,000 feet and upwards, in summer, and there can be little doubt that it breeds there. It has a peculiar note, which sounds like: "Chick!" "Chick!" "Chick!" repeated frequently and monosyllabically, and it is very restless in its habits. I obtained a specimen at Ziarat on July 6th, 1913, and sent it to the Bombay Natural History Society. In winter it migrates to lower elevations.

23. *Acanthopneuste nitidus.*—The Green Willow Warbler. [421].

A Willow Warbler was shot in Quetta Cantonments by Major Marshall in 1912, and I sent the skin to the Natural History Museum, South Kensington, where it was identified as this species. This was, I think, in October, and I observed others during the cold months of the year. I believe it to be a fairly common winter visitant, but I never observed it in summer.

24. *Scotocerca inquieta.*—The Streaked Scrub-Warbler. [445].

Common throughout Baluchistan in the low, thorny scrub bushes on the Mountain sides. It is a permanent resident all the year round and breeds in the scrub bushes. It is remarkable for its restless habits and for the peculiar way in which it constantly jerks its tail over from side to side. I obtained an adult specimen shot by Major Marshall in 1912, and shot a specimen in nestling plumage myself at Ziarat, at about 8,000 feet in July 1913.

Laniidæ.

25. *Lanius assimilis*—The Allied Grey Shrike. [470].

Occurs in various parts of Baluchistan but is nowhere common. I obtained an adult specimen, shot by Major Marshall in 1912, and sent to the Natural History Museum, South Kensington, where it was identified as this species. It breeds in the Valleys between Kach and Ziarat, and on July 10th, 1913, I shot a young male specimen in nestling plumage about half-way between Kach and Kahan. I sent the skin of this specimen also to the Natural History Museum, South Kensington, where it also was identified as this species. There is one specimen of this species in the MacMahon Museum at Quetta.

26. *Lanius fallax.*—Finsch's Grey Shrike. [471].

I have not personally observed this species in Baluchistan, but Oates, on page 461 of Vol. I, of the Birds of India, states that Blanford obtained a specimen at Gwadar in Baluchistan, and there is a specimen in the MacMahon Museum at Quetta, said to be of this species.

27. *Lanius vittatus.*—The Bay-backed Shrike. [473].

Occurs in Baluchistan, but is, I think, no where numerous. It remains only during summer and migrates to lower-lying regions in winter. It breeds in Baluchistan. On June 19th, 1913, I found a nest of this species about 8 feet from the ground in a wild olive tree in the Galbraith Spinney near Quetta. I shot both the old birds, and took the 4 eggs. The female with the eggs and nest I presented to the MacMahon Museum at Quetta, and the male I sent to the Natural History Museum, South Kensington.

28. *Lanius erythronotus.*—The Rufous-backed Shrike. [476].

Very common in Baluchistan in summer, and it breeds in the gardens and plantations. I found four nests in my garden in Quetta in 1913. On June 19th, 1913, I shot a fine male in the Galbraith Spinney near Quetta, and this specimen I sent to the Natural History Museum, South Kensington. This species seems to be very rapacious, and I, several times, saw one of them with a young sparrow it had killed. They appear only to eat the brain and then spit the body on a thorn and leave it. This species only remains in the Quetta Valley from early in April till the end of August, and then migrates to lower elevations. There are several specimens in the MacMahon Museum at Quetta.

29. *Lanius isabellinus.*—The Pale-brown Shrike. [479].

Common in Baluchistan during summer and undoubtedly breeds there. I saw several in the neighbourhood of Ziarat in 1913 in July. Several specimens were shot by Capt. Meinertzhagen, Royal Fusiliers in 1913, and there is a specimen in the MacMahon Museum, at Quetta.

30. *Lanius phœnicuroides.*—The Rufous Shrike. [480].

Common in Baluchistan during summer and like the foregoing species, undoubtedly breeds in the valley, between 6,000 and 8.000 feet above sea level. I obtained a specimen at Ziarat on July 9th, 1913, the skin of which I sent to the Natural History Museum, South Kensington, where it was identified as this species. Several specimens were shot in 1913, by Capt. Meinertzhagen, Royal Fusiliers, and there is a specimen in the MacMahon Museum at Quetta.

Oriolidæ.

31. *Oriolus krundoo*—The Indian Oriole. [518].

Occurs in Baluchistan in the summer months, and breeds in the valleys, but is nowhere common. On May 25th, 1912, I found a nest with 4 eggs, only slightly incubated, in a willow tree, about 18 feet from the ground, in the Galbraith Spinney near Quetta. I shot both the birds, and sent the skins and the eggs to a friend, who collects. There are 3 specimens of this species in the Macmahon Museum at Quetta.

Sturnidae.

32. *Pastor roseus.*—The Rose-coloured Starling. [528].

Common in Baluchistan. In summer it frequents the higher mountains and valleys, and I think it certainly breeds there. I shot a female at Ziarat at about 8,000 feet, on July 8th, 1913, and it had obviously been sitting on eggs. Several specimens were shot by Capt Meinertzhagen, Royal Fusiliers, during 1913. During the coldest months this species migrates to lower elevations. There are 4 specimens in the MacMahon Museum at Quetta.

33. *Sturnus humii.*—The Himalayan Starling. [529].

I several times observed flocks, in the winter months, of a small species of Starling, in the Quetta Valley. I believe they were of this species. Marshall states that he shot one or two specimens of this species in March and April.

34. *Sturnus menzbieri.*—The Common Indian Starling. [532].

I have frequently observed this species in the Quetta Valley in flocks in the winter months, but obtained no specimens. There are three specimens of this species in the MacMahon Museum at Quetta.

35. *Acridotheres tristis.*—The Common Myna. [549].

In July and August 1912, I observed some small flocks of this species in the Quetta Valley, but I do not think it is anywhere a permanent resident, or that it ever breeds in Baluchistan, except perhaps in the low-lying portions adjacent to the plains of India. There are two specimens of this species in the MacMahon Museum at Quetta.

Musicapidæ.

36. *Musicapa grisola.*—The Spotted Fly-catcher. [557].

Common in the Juniper Forests at Ziarat at 8,000 feet and higher. It certainly breeds there as I saw many birds in nestling plumage there in June 1912 and July 1913. In winter it migrates to lower and warmer regions.

37. *Siphia parva.*—The European Red-breasted Fly-catcher. [561].

Frequents the Quetta Valley in April and in October, evidently during its migration. It is not seen during winter or summer, and I do not think any ever remain to breed in Baluchistan, but that they all pass on northwards for breeding. I saw this species frequently in my garden in Quetta during April and October. There are four specimens of this species in the MacMahon Museum at Quetta.

38. *Terpsiphone paradisi.*—The Indian Paradise Fly-catcher. [598].

I have never personally observed this species in Baluchistan, but have been informed by several competent observers that it occasionally frequents the gardens and orchards, and has been found breeding at Ziarat and elsewhere. There is one specimen of this species in the MacMahon Museum at Quetta.

Turdidæ.

39. *Pratincola caprata.*—The Common-Pied Bush-Chat. [608].

Common in Baluchistan during the summer. It breeds in all the valleys. I found a deserted nest with one egg in it in a hole in a bank on the road leading from Quetta to the Brewery in May 1912. In winter it migrates to warmer regions. I obtained a male specimen near the Galbraith Spinney, 2 miles out of Quetta, also in May 1912. There are three specimens of this species in the MacMahon Museum at Quetta.

40. *Pratincola maura.*—The Indian Bush-Chat. [610].

Common in the higher valleys of Baluchistan. I saw many at Ziarat in the summer at about 8,000 feet, and it undoubtedly breeds there, as I saw young birds in nestling plumage in June 1912 and July 1913. In winter it migrates to warmer regions. There is one specimen in the MacMahon Museum at Quetta.

41. *Saxicola picata.*—The Pied Chat. [618].

A summer visitant arriving in end of March and leaving in October. It breeds in all the valleys. Marshall records having found nests of this

species in April and May in holes among rocks. In winter it migrates to warmer regions. I obtained two specimens in 1912. There is one specimen of this species in the MacMahon Museum at Quetta.

42. *Saxicola capistrata.*—The White-headed Chat. [619].

I have observed this species occasionally, but it is nowhere common in Baluchistan, and I obtained no specimens. Marshall records having shot a specimen of this species in February near Sibi.

43. *Saxicola opistholeuca.*—Strickland's Chat. [620].

I have not personally observed this species in Baluchistan, but there is a specimen, said to be of this species, in the MacMahon Museum at Quetta.

44. *Saxicola barnesi.*—Barnes' Chat. [622].

Occurs in Baluchistan, but is never common. On November 15th, 1913, Capt. Meinertzhagen, Royal Fusiliers, gave me a fine male specimen just shot by him, and he got several other specimens the same day, all males. He saw no females. There is one specimen in the MacMahon Museum at Quetta, said to be of this species.

45. *Saxicola finschi.*—Finsch's Chat. [622A].

I have never personally observed this species in Baluchistan but in 1912, Major Marshall, Royal Garrison Artillery, brought me a specimen just shot by him, which I skinned and sent to the Natural History Museum, South Kensington, where it was identified as this species. I came across no other specimens of this species, nor did I hear of any others being obtained, while I was in Baluchistan.

46. *Saxicola isabellina.*—The Isabelline Chat. [625].

Common in Baluchistan from March to October and breeds there. Marshall records having found several nests with young birds in April, in holes in the ground, 2 feet or more in. This species migrates to warmer regions in the winter months. There are three specimens of this species in the MacMahon Museum at Quetta.

47. *Saxicola deserti.*—The Desert Chat. [626].

Occurs in Baluchistan during the winter months, but is, I think, never common. Most frequently seen in March. I do not think it breeds in Baluchistan. There is one specimen, said to be of this species, in the MacMahon Museum at Quetta.

48. *Saxicola montana.*—Gould's Chat. [627].

I have neither observed nor obtained any specimens of this species, but it must be found in various parts of Baluchistan, *vide* note by Oates on page 79 of Vol. II, regarding this species.

49. *Saxicola chrysopygia.*—The Red-tailed Chat. [628].

I frequently observed this species in the Quetta Valley during October and November. I never obtained any specimens, but I believe several were shot in 1913 by Capt. Meinertzhagen, Royal Fusiliers.

50. *Ruticilla erythronota.*—Eversmann's Redstart. [642].

Common in the Quetta Valley during the winter months, arriving in October, and leaving at end of March. I shot a fine male specimen on January 22nd 1912. There are 6 specimens of this species in the MacMahon Museum at Quetta.

51. *Ruticilla rufiventris.*—The Indian Redstart. [644].

Common in the Quetta Valley during the winter months, and like the foregoing species, is found all over Baluchistan from October to March, but in the higher valleys only in summer; and it certainly breeds at 8,000 feet and upwards, as I saw young birds in nestling plumage at Ziarat in June and July. There is one specimen in the MacMahon Museum at Quetta.

52. *Cyanecula suecica.*—The Indian Blue-throat. [647].

Common in the Quetta Valley during the winter months. I saw one in my garden as late as April 10th, but obtained no specimens. There are three specimens of this species in the MacMahon Museum at Quetta.

53. *Daulias golzi.*—The Persian Nightingale. [649].

I only once observed one of these birds in the wild state, and that was in my garden in Quetta in October 1913. These birds are frequently kept in cages in the Quetta Bazaar by natives, as they are beautiful songsters. These are all said to come from Kandahar. There is one specimen of this species in the MacMahon Museum at Quetta.

54. *Merula atrigularis.*—The Black-throated Ousel. [677].

Common in the Quetta Valley during the winter months, leaving in April and not returning until November. It is often seen in flocks. I shot a male specimen on January 22nd, 1912, in the Woodcock Spinney near Quetta. There are two specimens of this species in the MacMahon Museum at Quetta.

55. *Petrophila cyanus.*—The Western Blue-Rock Thrush. [693].

Fairly common in the higher valleys of Baluchistan in summer. I observed a good many, including birds in nestling plumage, between Kach and Ziarat in June and July. Marshall records finding a nest with 4 fresh eggs in April. There is one specimen of this species in the MacMahon Museum at Quetta.

56. *Monticola saxatilis.*—The Rock Thrush. [694].

I have not personally observed this species in Baluchistan. Marshall records shooting a female of this species in January and a male on 25th April. There are two specimens said to be of this species in the MacMahon Museum at Quetta.

57. *Turdus viscivorus.*—The Missel Thrush. [695].

Fairly common in the Juniper Forest at Ziarat, at 8,000 feet and upwards in summer, and I think it undoubtedly breeds there. I observed them frequently in June and July. Comes down into the lower valleys in winter.

58. *Tharrhaleus atrigularis.*—The Black-throated Accentor. [716].

A winter visitant only, in Baluchistan, as far as the lower valleys are concerned, though, I believe, I saw some at Ziarat in the summer; but I am uncertain of this, as I did not obtain any specimens there. I obtained a male specimen in my garden at Quetta on November 23rd, 1913. There is one specimen of this species in the MacMahon Museum at Quetta. Marshall records shooting a specimen near Quetta in January.

Ploceidæ.

59. *Ploceus manyar.*—The Streaked Weaver-Bird. [723].

On July 17th, 1913, I saw a male and female of this species at Samungli, 4 miles west of Quetta, but having no gun with me at the time, I could

not shoot them. I believe, however, that these two birds must have escaped from cages in the Quetta Bazar, as I never saw or heard of any others being seen in the wild state, nor did I ever see any nests, which they invariably build in the country they frequent.

60. *Sporæginthus amandava.*—The Indian Red Munia. [738].

I frequently saw small flocks of this species in the Quetta Valley in late autumn, and in November 1911 I shot 2 females out of a flock in my garden, but did not get a male. There are four specimens of this species in the MacMahon Museum at Quetta.

Fringillidæ.

61. *Pycnoramphus carneipes.*—The White-winged Grosbeak. [743].

This species is common in summer at Ziarat at 8,000 feet and upwards, in the Juniper Forest, where it undoubtedly breeds. I shot a male and a female at Ziarat in June 1912, and gave the skins to the MacMahon Museum at Quetta. In winter this species descends to the lower valleys.

62. *Propasser grandis.*—The Red-mantled Rose-Finch. [757].

Common in summer in the higher valleys about Ziarat, at 8,000 feet and upwards where it certainly breeds, as I saw birds in nestling plumage in June and July. I shot a male specimen at Ziarat in June 1912, and gave the skin to the MacMahon Museum at Quetta. In winter this species descends to the lower valleys.

63. *Rhodospiza obsoleta.*—The Quetta Rose-Finch. [764A].

Common throughout the Quetta Valley where it breeds. I found a nest with young birds in a garden in May 1912. I obtained a fine male specimen in the Galbraith Spinney near Quetta on May 30th, 1912. There are 4 specimens of this species in the MacMahon Museum at Quetta.

Marshall mentions that Hume's Hawfinch is found in Baluchistan. In this, I think, he was mistaken, and that the bird he referred to was really "Rhodospiza obsoleta."

64. *Carduelis caniceps.*—The Himalayan Goldfinch. [767].

Common in the Quetta Valley during the winter months. In summer it ascends to the higher valleys, and is common at Ziarat at 8,000 feet and upwards, and, I think, must breed there, though I did not succeed in finding any nests. I obtained three specimens in my garden in Quetta in November 1913 There are two specimens of this species in the MacMahon Museum at Quetta.

65. *Metoponia pusilla.*—The Gold-fronted Finch. [771].

Common in summer at Ziarat, where it also breeds, as I saw many young birds in nestling plumage in June and July. I have seen this species in the Quetta Valley, even in winter. I shot a male at Ziarat in July 1913. There are two specimens of this species in the MacMahon Museum at Quetta. This species is very common in Baluchistan and other parts of the North-West Himalayas.

66. *Fringilla montifringilla.*—The Brambling. [774].

Common in Quetta during the cold months of winter, when it is seen in flocks in the gardens and spinneys. They arrive early in November, and

leave early in March. I shot a male in my garden in Quetta in November 1913. There are three specimens of this species in the MacMahon Museum at Quetta.

67. *Passer domesticus.*—The House Sparrow. [776].

Very common in Baluchistan at all seasons. It breeds in the eaves of houses, in banks, and in trees, etc. I shot several specimens at Quetta at different times of the year. There are two specimens of this species in the MacMahon Museum at Quetta.

68. *Passer hispaniolensis.*—The Spanish Sparrow. [778].

I have never personally observed this species in Baluchistan, but was informed by Mr. J. W. N. Cumming, Secretary, Baluchistan Natural History Society, that he had obtained several specimens in Baluchistan near Quetta.

69. *Passer montanus.*—The Tree-Sparrow. [779].

Common in Baluchistan at all seasons. It breeds in the eaves of houses, in hollow trees, etc. I shot several specimens, at different seasons, in my garden at Quetta.

70. *Petronia stulta.*—The Rock Sparrow. [782].

I have not personally observed this species in Baluchistan, but it undoubtedly occurs in Baluchistan. There is one specimen of this species in the MacMahon Museum at Quetta.

Emberizinæ.

71. *Emberiza leucocephala.*—The Pine Bunting. [792].

I occasionally observed this species in flocks in the Quetta Valley during the winter months, but I never obtained any specimens. There are three specimens of this species in the MacMahon Museum at Quetta.

72. *Emberiza stewarti.*—The White-capped Bunting. [793].

Common during the Summer months in the higher valleys of Baluchistan. I found it common at Ziarat at 8,000 feet and upwards in July and June of 1912 and 1913, and found a nest with young birds in it in the latter half of June. I obtained a good male specimen on June 24th, 1912, at Ziarat.

73. *Emberiza stracheyi.*—The Eastern Meadow Bunting. [794].

I have never observed this species myself in Baluchistan, but it undoubtedly occurs there. In the MacMahon Museum at Quetta, there is one specimen, said to be of this species.

74. *Emberiza buchanani.*—The Grey-necked Bunting. [795].

I shot a male specimen of this species on August 21st 1913 at Samungli, 6 miles from Quetta. I never say any other specimens of this species, but Marshall states that it is common in the hills in April.

75. *Emberiza luteola.*—The Red-headed Bunting. [800].

I saw several specimens of this species, early in July 1913, between Kach and Ziarat, and have no doubt that it breeds in that locality. Marshall states that he saw this species at Khelat. I think it is rather local in its distribution, and I never observed it in the Quetta Valley. There is one specimen of this species in the MacMahon Museum at Quetta.

76. *Emberiza striolata.*—The Striolated Bunting. [802].

I have not personally observed this species in Baluchistan, but Marshall states that it is not rare in the hills in summer, and probably breeds there, as he saw them at the end of June.

Hirundinidæ.

77. *Chelidon urbica.*—The Martin. [804].

I have occasionally observed Martins in the Quetta Valley, which I believe were of this species, but I never obtained a specimen. Marshall records that he shot one, which he identified as of this species, and gives its measurements as follows, *viz*: length 5$\frac{3}{4}$ in., Wing 4$\frac{1}{8}$. in., Tail 2$\frac{3}{8}$ in.

78. *Ptyonoprogne rupestris.*—The Crag Martin. [810].

Common throughout the mountains of Baluchistan, where it breeds, though I personally never found any nests, but Marshall records finding nests in May and June with young birds in them. I have taken the nest of this species in Ladak.

79. *Hirundo rustica.*—The Swallow. [813].

Very common in Baluchistan in summer. It arrives in March, and migrates to warmer regions again in October. It breeds in the Quetta Valley in May, and it is quite a common thing to see these birds flying in and out feeding their young in their nests, built in the native shop-fronts in the main street of the Quetta Bazaar. during April and May. There is one specimen of this species in the MacMahon Museum at Quetta.

80. *Hirundo smithii.*—The Wire-tailed Swallow. [818].

Found sparingly in the Quetta Valley in summer, migrating to warmer regions again in the winter. I think it must certainly breed in Baluchistan, though I never found a nest, though I often saw the birds.

81. *Hirundo rufula.*—The European Striated Swallow. [824].

I occasionally observed a species of Striated Swallow in Baluchistan, which I believe was this one, but I never obtained a specimen. Marshall records that *Hirundo nepalensis*, Hodgson's Striated Swallow is fairly numerous round Quetta in summer, and that he found a nest. Perhaps he was right, but I took the species of striated swallow seen in the Quetta Valley to be *Hirundo rufula*, but it is impossible to determine this, without obtaining specimens.

Motacillidæ.

82. *Motacilla alba.*—The White Wagtail. [826].

Common in the Quetta Valley from October to April, but none are seen there in summer. There is one specimen of this species in the MacMahon Museum at Quetta.

83. *Motacilla personata.*—The Masked Wagtail. [829].

I occasionally observed this species in the Quetta Valley in winter, and also at Ziarat at about 8,000 feet in June and July, and I think it must certainly breed there, though I did not find any nests. It appears to be nowhere common at any season.

84. *Motacilla melanope.*—The Grey Wagtail. [832].

I observed this species occasionally in the Quetta Valley in winter, but obtained no specimens. I think it probably breeds in the higher valleys. There is one specimen of this species in the MacMahon Museum at Quetta.

85. *Motacilla borealis.*—The Grey-headed Wagtail. [833].

I occasionally observed this species in the latter half of March and early in April in the Quetta Valley, but obtained no specimens. There is one specimen of this species in the MacMahon Museum at Quetta.

86. *Motacilla beema.*—The Indian Blue-headed Wagtail. [835].

I have not personally observed this species, but there appears to be no doubt that it visits Baluchistan during its winter migration. There is one specimen in the MacMahon Museum, said to be of this species.

87. *Motacilla feldeggi.*—The Black-headed Wagtail. [836].

I saw several specimens of this very handsome and distinctly-coloured little Wagtail near Tarin Shahr, about 2 miles north of Quetta, in November 1912, and also in other localities in the Quetta Valley. This species like several other Wagtails, only passes through Baluchistan in its winter migration, and does not stay to breed. Those I saw in November had very black heads, though Oates says the head is black in summer plumage.

88. *Motacilla citreoloides.*—Hodgson's Yellow-headed Wagtail. [838].

I frequently observed this species in the Quetta Valley during the winter months, but especially in the months of migration, October and March, I do not think it ever breeds in Baluchistan. I obtained two specimens, shot by Major Marshall, Royal Garrison Artillery, in November 1912. It is possible that *Motacilla citreola* may also pass through Baluchistan, but in winter plumage it is difficult to distinguish it from *M. citreolides*.

89. *Anthus trivialis.*—The Tree-Pipit. [840].

This species is occasionally to be seen in the Quetta Valley during the winter months, but I do not think it is ever common anywhere in Baluchistan, nor does it, I think, ever stay to breed there.

90. *Anthus similis.*—The Brown Rock-Pipit. [844].

This species is common at Ziarat, at 8,000 feet and upwards in summer and certainly breeds there. Marshall records finding a nest with young birds on May 11th. I obtained no specimens, but several were shot in 1913, by Capt. Meinertzhagen, Royal Fusiliers. I frequently saw this species in the hills round Quetta, but never in the Quetta Valley itself. It appears to migrate to lower elevations in winter, but of this I am not quite certain.

91. *Anthus rosaceus.*—Hodgson's Pipit. [850].

At Ziarat in June and July I frequently observed a Pipit, which I believe to have seen this species, but as I obtained no specimens I was unable to make certain of this. The birds, I saw, were certainly breeding at about 9,000 feet.

92. *Anthus spinoletta.*—The Water Pipit. [851].

I have not personally observed this species in Baluchistan, but I believe it habitually passes through Baluchistan on migration. There are 2 specimens, said to be of this species, in the MacMahon Museum at Quetta.

93. *Oreocorys sylvanus.*—The Upland Pipit. [853].

I have never personally observed this species in Baluchistan, but there is a specimen, said to be of this species, and shot at Quetta, in the MacMahon Museum at Quetta.

ALAUDIDÆ.

94. *Alaemon desertorum.*—The Desert Lark. [854].

Found sparingly throughout Baluchistan at all seasons and certainly breeds there. I saw one in the winter of 1911-12 in the Quetta Valley, and I obtained a fine male specimen in the Upper Zhob Valley in April 1891.

95. *Melanocorypha bimaculata.*—The Eastern Calandra Lark. [859].

Frequents the Quetta Valley in summer and I think breeds there, though I never found a nest. There is one specimen in the MacMahon Museum at Quetta.

96. *Alauda gulgula.*—The Indian Sky-Lark. [861].

Common in Baluchistan, and certainly breeds there. Marshall records that *Alanda arvensis* is common in the Quetta Valley. I think it is probable, that both species are common as they are so much alike as to be almost indistinguishable one from the other.

97. *Calandrella acutirostris.*—Hume's Short-toed Lark. [861].

Common in the Quetta Valley, more so in winter than in summer, but I think it probably breeds in Baluchistan. I obtained a good specimen on August 7th, 1913, near the Nar reservoir, west of the Hunna Valley, and about 6 miles from Quetta. Marshall records that *Calandrella brachydactyla* is common round Quetta in the winter, so I think that probably both species are common.

98. *Galerita cristata.*—The Crested Lark. [874].

Very common in Baluchistan at all seasons, and breeds there. I found many nests, one found on May 11th, 1912, had 5 eggs in it which I took. I shot the male bird near the nest, and preserved the skin. There is one specimen of this species in the MacMahon Museum at Quetta.

99. *Ammomanes phœnicuroides.*—The Desert Finch-Lark. [878].

Common throughout the foot-hills stretching from the mountain ranges into the open valleys of Baluchistan, at all seasons of the year. It also certainly breeds in Baluchistan, though I never succeeded in finding a nest. I obtained a specimen of this species above the Staff College, and below Kitchener Hill, about 3 miles from Quetta on August 7th, 1913.

PROGRESS OF THE MAMMAL SURVEY.

Owing to the War and the departure of our three collectors Mr. Shortridge, Capt. Macmillan and Major Mayor for the front we have not much progress to report in this Journal.

Mr. Crump—the only remaining Collector—has completed his work in Sikkim and amongst those who have rendered him great assistance, mention must be made of Mr. R. S. Lister and Mr. C. H. Dracott, C.E., of Gangtok. Both of these gentlemen and also Mr. H. Stevens are carrying on the work and are obtaining specimens for us. After finishing Sikkim, Mr. Crump collected at Darjeeling on the Eastern border of Nepal. He then descended to Kurseong and Siliguri and is now at Jalpaiguri where his tour will end, as he is leaving India to proceed to England to join the Army.

We feel sure that members whilst regretting the circumstances which have taken all our trained collectors from the work of the Survey, will understand and applaud the spirit which they are showing. Much as we desire to complete the Mammal Survey of India and Burma we know that members will recognize with us the fact that the War must come before the Survey. We hope that when the War is finished our collectors will return to complete the Survey.

As we had some of the skinners on our hands we thought it advisable to continue the work on a small scale and therefore in December we sent Mr. S. H. Prater, the head assistant in our Museum, on an experimental trip to the Koyna Valley, Satara District, to collect Mammals. Mr. Prater was away about a month and 20 days and made an interesting collection of about 420 specimens. On his return, as he was anxious to continue the work, we sent him in March to the Upper Sind Frontier. Mr. Prater went first to Jacobabad and Kashmir. After collecting there he left for Sukkur and Khairpur State. He then proceeds to Larkhana and after that comes South to Hyderabad (Sind) and Karachi. Up to date Mr. Prater has obtained some 500 specimens in Sind.

The Society also received an offer of the services of Mr. R. Shunkar Narayan Pillay to collect Mammals for them in Travancore and Southern India and we decided to avail ourselves of this opportunity as specimens from S. India are desirable for comparison with those from Ceylon. Mr. Pillay commences work in May.

The following list of Mammals which are urgently required is given in hopes that members resident in any of the districts

mentioned will try and collect specimens and so help to carry on the Survey while our collectors are at home. This list does not mean that other kinds of Mammals are not wanted but only that the ones mentioned are specially required at the present time. Any specimens other than those mentioned will be most acceptable and useful. The specimens may be made into flat skins but the sex and date of capture should be noted. The skull should be kept and numbered to correspond with the skin and only roughly cleaned and dried:—

South India.—Indian Wolf, Fox, Hedgehog, Flying Squirrels, Muntjac.
- Malabar.—Malabar Civet Cat, Fishing Cat.
- Eastern Ghats.—Tree Shrews.

Bombay Presidency.—Indian Wolf, Hedgehog, Tree Shrew, Hare, Muntjac.
- Deccan.—Indian Wolf, Fox, Wild Dog, Porcupine.
- Dangs.—Flying Squirrel, Large Indian Squirrel.

Rajputana.—Desert Fox, Wolf, Desert Cat, Porcupine.

Punjab.—Desert Fox, Wolf, Hares, Hedgehogs.

North-West Provinces.—Wolves, Foxes, Hares, Porcupines.

Kashmir.—Mungoose, Marmots, Foxes.

Central India.—Wolves, Hares, Muntjac.

Central Provinces.—Muntjac, Tree Shrews.

Bengal.—Wolves, Foxes, Porcupine, Wild Pig.
- Sunderbunds.—Muntjac, Leopard Cat, Porcupine.
- Lower Bengal.—Hares, Muntjac, Leopard Cat, Foxes, Porcupine.

Behar and Orissa.—Wolves, Porcupines, Hares, Tree Shrews, Muntjac.
- Singbhoom.—Flying Squirrel.

Assam.—Flying Squirrel, Pallas's Squirrel. Himalayan Monkey, Muntjac.
- Goalpara.—Hoolock.
- Cherripungi.—Bamboo Rat.

Burma.—Hares, Flying Squirrels, Wild Dogs.
- Arakan.—Bamboo Rat, Flying Squirrels.
- Rangoon.—Flying Squirrel.
- Pegu.—Hare, Ferret Badger, Mungoose.

If members are unable to obtain any of the above animals themselves perhaps they will let others know what skins we are in want of.

To give members some idea of the results achieved by the Mammal Survey we give below a list of all the species described through the work of the Survey. This list contains (1) specimens collected by the Society's collectors, (2) specimens collected by members and sent in through our collectors, (3) specimens already in the British Museum which have been described through the help of the Survey specimens.

It should be kept in mind that the results of the Survey are not merely to be judged by the number of new species described but also by the additions to our knowledge of distribution, variation, &c.

When the Volume on Mammals in the Fauna was written many species were, and in some cases are known only, from very few specimens. This has led to a want of clearness in some descriptions and the unnecessary massing or dividing of certain species. Since the above Volume was written new species have been described from time to time and some of them the collections of the Survey have shown cannot hold good.

Civets.

Banded Palm Civet ..	*Hemigalus derbianus incursor.*	Bankachon, Tenasserim.

Mungooses.

Pale-grey Mungoose ..	*Mungos mungo pallens* ..	Palanpur.
Small yellow Mungoose..	*Mungos auropunctatus helvus.*	Deesa.

Bats.

The Obscure Bat ..	*Kerivoula crypta* ..	Shimoga, S. India.
Tuft-tailed Pipistrelle ..	*Pipistrellus lophurus* ..	Maliwun, Tenasserim.
Northern Dwarf Pipistrelle.	*Pipistrellus mimus glaucillus* (3).	Multan.
Peyton's Bat ..	*Myotis peytoni* ..	Gersoppa Falls, Kanara.
	Myotis sicarius (3) ..	N. Sikkim.
	Leuconœ peshwa (3) ..	Poona.
The Greater Indian Mouse tailed Bat.	*Rhinopoma kinneari* ..	Cutch.

Squirrels.

Vassal's Flying Squirrel.	*Petaurista annamensis* (3).	Bali, S. Annam.
Taylor's Flying Squirrel.	*Petaurista taylori* (2) ..	Bankachon, S. Tenasserim.

Venning's Flying Squirrel.	*Petaurista venningi* (2) ..	Kalaw, S. Shan States.
Blyth's Flying Squirrel.	*Sciuropterus phayrei probus*,	Mt. Popa.
	Sciuropterus phayrei taotum (3).	Laos Mts., Siam.
Coorg Giant Squirrel ..	*Ratufa indica superans* ..	Watekolli, Coorg.
The Black-shouldered Giant Squirrel.	*Ratufa india centralis* ..	Bori, Hoshangabad, C. P.
Irrawaddy Squirrel ..	*Sciurus pygerthrus janetta*.	Mandalay.
N. Shan States Black-backed Squirrel.	*Sciurus atrodorsalis shanicus*.	Gokteik, N. Shan States.
	Sciurus sladeni midas (3)..	Myitkyina.
	„ „ *rubex* (3) ..	Lonkin, Myitkyina Dist.
	„ „ *bartoni* (3).	Uya R. U. Chindwin.
	„ „ *solutus* (3).	Homalin.
Adamson's Red Cheeked Squirrel.	*Dremomys rufigenis adamsoni*.	Kalaw, U. Burma.
Yunnan Red Cheeked Squirrel.	*Dremomys rufigenis ornatus* (3).	Yunnan.
Berdmore's Squirrel ..	*Menetes berdmorei decoratus*.	Mt. Popa.
	Menetes berdmorei mocrescens (3).	Bali, Annam.
	Menetes berdmorei consularis (3).	Bangkok.
Coorg Jungle Squirrel ..	*Funambulus wroughtoni* ..	Srimangala, Coorg.

Mice and Rats.

Wroughton's Tree Mouse.	*Vandeleuria wroughtoni* ..	Patal, Surat Dist.
Sandy Red Tree Mouse..	*Vandeleuria oleracea spadicea*.	Lunawa, Palanpur.
Kumaon Tree Mouse ..	*Vandeleuria oleracea modesta*.	Ramnagar, Kumaon.
Ruddy Tree Mouse ..	*Vandeleuria oleracea rubida*	Bageshwar, Kumaon.
Flower's Tree Mouse ..	*Vaudeleuria sybylla* (3) ..	Siam.
The Northern Field Mouse.	*Leggadilla dunni* (3) ..	Ambala.
The smaller Ashy Spiny Mouse.	„ *cindrella* ..	Cutch.
Phillips' Spiny Mouse ..	„ *phillipsi* ..	Nimar.
Coorg Hill Spiny Mouse.	„ *grahami* ..	Wokoli, S. Coorg.
Coorg Lowland Spiny Mouse.	„ *hannyngtoni* ..	Makut, S. Coorg.
Burmese Spiny Mouse ..	„ *shortridgei* ..	Mt. Popa.
Grey Spiny Mouse ..	„ *surkha* ..	Vijayanagar, Bellary.
	„ *bahadur* ..	Karwar, Kanara.
Mysore Spiny Mouse ..	„ *siva* ..	Sivasamudram, S. Mysore.
Nepal Spiny Mouse ..	„ *gurkha* ..	Jerna, Kumaon.
Burmese Field Mouse ..	*Mus cooki*	Gokteik, N. Shan States.
Mayor's Rat	*Coelomys mayori*	Ceylon.

MAMMAL FUND.

FURTHER LIST OF SUBSCRIPTIONS UP TO 30TH APRIL 1915.

Name.				Amount.		
				Rs.	A.	P.
Amount previously acknowledged in Journal No. 2 Vol. XXIII				85,641	14	7
Bell, T. R., I.F.S.				100	0	0
Forsyth, Dr. Wm.				5	12	0
LeMesurier, H. P.				15	0	0
				85,762	10	7
	Rs.	A.	P.			
Interest credited by Bank on current Account up to 31st March 1915	404	13	8			
,, B. P. T. Bonds up to 31st March 1915..	379	9	4			
,, Fixed Deposit up to 31st March 1915	1,259	6	5			
				2,043	13	5
PROMISED.						
FEDERATED MALAY STATES GOVERNMENT $ 1,000=	Rs.	1,750				
GOVERNMENT OF BIHAR AND ORISSA ..	,,	1,500				
				3,250	0	0
				91,056	8	0

The subscription to the Mammal Survey Fund up to date amounts to Rs. 85,762-10-7 added to which we have Rs. 2,043-13-5 for interest earned and Rs. 3,250 promised making a total of Rs. 91,056-8-0. The expenditure up to date amounts to Rs. 77,320-14-4, leaving a balance in hand and invested of Rs. 10,485-9-8.

REVIEWS.

BIRDS OF THE INDIAN HILLS.*

There is a great want of a book on the Common Birds of India with popular descriptions of the different species. Mr. Dewar's new book on the "Birds of the Indian Hills" to some extent fills this want as far as the Himalayas and the Hills of Southern India are concerned. It is true a number of the birds described are also found in the plains but on the other hand many are not mentioned which are common there, but for these the enquirer can refer to Eha's "Birds of Bombay."

Part I.—Starts with a general chapter on the habitat of Himalayan birds. Mr. Dewar then gives a list of the Common Birds he observed in Kumaon, taking that district as representative of the Western Himalayas. This is followed by an account of the birds noted in the Eastern Himalayas, but descriptions are only given of those species not mentioned in the previous chapter. There are some short chapters on special birds such as the Black Bulbuls, the Spotted Forktail, the Great Himalayan Barbet, &c., all of which Mr. Dewar has something interesting to tell about.

Part II.—Consists of a list of the Common Birds found in the Nilgiris, made chiefly round the Hill Stations of Coonoor and Ootacamund and should enable the visitor to name most of the birds seen in the garden or during the course of a ramble. For the benefit of visitors to the Palni Hills a list of the common species is included in Part III. This, however, unlike the other lists, is not made on Mr. Dewar's personal observations, but is based on a paper by Dr. Fairbank written some 40 years ago in *Stray Feathers*. With these four lists we can safely say that the visitor to the Himalayas or South Indian Hills should be able to recognize most of the more conspicuous birds likely to be met with. In some cases however the observer is bound to be disappointed in not finding a particular bird but it is impossible in a popular book to mention all the species. The fact whether a bird is common or not and should be included in such list as Mr. Dewar's is difficult to decide as it depends to a great extent on the powers of observation of the observer, still we think Mr. Dewar has made a very good selection.

† INDIAN FOREST INSECTS.

"*Indian Forest Insects of Economic Importance, Coleoptera*," is the title of a recent work by Mr. E. P. Stebbing, late of the Indian Forest Service. Mr. Stebbing, it may be mentioned, for some years occupied the position of Zoologist in the Forest Research Institute at Dehra Dun. The author informs us in the preface that the chief aim of the book is the study of the Insect Fauna of the Indian forests from the economical standpoint. Presumably this volume is the first instalment of a series as it deals only with the Beetles.

The book as it is published is too large for easy handling and the paper is of that shiny sort which is so trying to the eyes when there is a strong light upon it. It would have been better had it been of the ordinary quarto size, published in two parts. The print is, however, very clear and good and the illustrations are excellent. Many of these latter, particularly the figures of the insects themselves, have been published before in various places; many

* Birds of the Indian Hills, by Douglas Dewar. London, John Lane. 1905, six shillings net.

† Indian Forest Insects, by E. P. Stebbing. Published by order of His Majesty's Secretary of State for India in Council. London. Price fifteen shillings.

of them are new ; they are all remarkably good likenesses of the originals and will therefore be of considerable value for identification purposes. The enlarged pictures of the smaller insects appertaining to the families *Platypodidæ, Scolytidæ, Curculionidæ, Bostrychidæ* and others will be very useful for ease of reference to enable future enquirers to recognize known enemies of forests and to distinguish between them. The photographs of wood sections, trunks of trees, &c., showing the style of damage done by these enemies in India ought also to be of considerable worth.

It would have enhanced the value of the book if Mr. Stebbing had a systematic key to the different families and sub-families mentioned in it. They are not numerous and it would not have been difficult to do so. It is the same with the genera and species dealt with. The descriptions of the perfect insects, grubs and pupæ are very meagre and will, in the majority of cases, be useless for identification purposes but this objection is, to a great part, mitigated by the excellent figures, where these are given. There is a goodly number of insects mentioned of which only a damaged specimen unfit for identification has ever been obtained by the author, there are some even of which only the grub has been seen. These might have been omitted without anything being lost. There is also a good deal of unnecessary repetition.

On the whole "Indian Forest Insects" is a book which, if it does not go very far towards filling an empty gap in Indian forest literature, we must recognize as a very laudable effort towards supplying a distinct want. And, as such, we should welcome it. It is but a beginning ; in the words of the author, "a pioneer intended to indicate to others the lines upon which further study of the subject should proceed." At the best of times the number of students of these forest zoology matters is limited and, up to date, there have not been many works of reference to help them on their way ; such as exist besides are written in French and German requiring a more or less intimate knowledge of those languages for their perusal. There may of course be English translations but, even then, they would not be of much use ; Indian and European conditions being so different that most of what is written in them would have only a limited application out here. So Mr. Stebbing is to be congratulated on having made a beginning; and, considering the difficulties that always present themselves in beginnings, in having done so with considerable success, notwithstanding the imperfections from lack of material and information inherent in all new ventures of the sort. Perseverance and courage deserve recognition and we have evidence of both these in the present work.

Therefore, as a stimulus to the study of forest insects and their ways, this book is of considerable value. As a work of real, practical utility, it will, we fear, have little scope. And this is due to two causes, both of which are outside the author's influence. One is dependent upon the state of forests management in general out here in India, the other is attributable to the paucity of insects mentioned. The prescriptions for dealing with insect pests could never be applied on any large scale owing to the expense entailed, the difficulty of obtaining sufficient labour at the proper time in most localities, the want of establishment and the ignorance of the people. They could be carried out only in plantations and in isolated forests of limited extent where effective supervision is possible and the means of transport are always at hand. Such conditions exist only in comparatively negligeable areas. The other cause can only be removed by years of entomological study. Although numbers of insects are known to the systematic scientists there are still very many that are not ; and, except for the life histories and habits described for certain beetles in Mr. Stebbing's present book, little has been published, because little is known of their ways.

inter-relations and influence upon forests. Most of the life histories, even, that we find in the book are incomplete and will have to be confirmed and amplified before they can serve any useful purpose. Some 480 *Coleoptera* are enumerated as of forest importance Of these some 56 have been described by the author personally and five others bear his name. Of the first number some will be found, we think, to have very little to do with damage to forest growth either directly or indirectly as, for example, *Hydrophilidæ*, *Silphidæ*, and *Tenebrionidæ*.

On reading through the book somewhat hurriedly and with the further disadvantage of not having existing notes to refer to at the moment, we may mention various points that occur to us in connection with what is written therein. Under "Damage done to Roots" on page 12, *Phassus malabaricus* and other *Hepialidæ* or Ghost-Moths have been omitted; they are well known root-borers and sometimes do much damage to *Trema orientalis* in Bombay. Another species damages plants of the genus *Strobilanthes*. It is more than probable both attack more important species as well and their extraordinary fertility would point to their being enemies to be feared where they occur. *Duomitus ceramicus* also attacks fig trees of many species (page 14). Under "Damage to Buds" it may be noted that weevils bore into and breed in many of them. Under that to "Inflorescences" the damage done by butterfly larvæ of the lycænid genera *Virachola* and *Rapala* which occur all over India might have been mentioned. The imagines of the former lay their eggs on the flower and the larvæ resulting live in the fruit which they completely destroy; the larvæ of the latter eat flowers. Both exist sometimes in large numbers. The statement advanced tentatively at the bottom of page 31 about the generations of parasitic insects has much support in fact. In many cases we know that the generations of host and parasite are equal in number and each of practically equal duration. On page 40 the *Arbela* larva is mentioned, seemingly as somewhat exceptional in that it feeds on the bark of more trees than one. The fact is not exceptional at all. There are very few larvæ of *Lepidoptera* that are confined to one single foodplant and, we may therefore infer, few coleopterous larvæ either. Hundreds of instances could be adduced proving this. In fact we imagine that it will be found eventually that the number of insects that are confined to a single species for their food are very few in number.

This fact—that the foodplants of all insects may be varied—will be one of the chief difficulties of preventing or combating attacks on forests by such enemies; and when we consider that there is hardly a forest in India outside the pine and sal areas that do not contain dozens of species, all mixed up together, of timber-trees, climbers and creepers and useless soft woods that are as often as not closely related to each other, the difficulties can well be imagined by the most uninitiated. Take, for example, the case of the teak-pest, *Pyrhausta machæralis*, that occurs sometimes in such numbers as to skeletonize every leaf on every teak tree in tracts of 200 miles in length by 50 in breadth. It is called the Teak Defoliator. But the larva—it is the larva that does the damage—feeds upon any member of the botanical family *Verbenaceæ* and, may be, upon other plants as well; it would, therefore, be a very difficult problem to devise any practical means to combat or prevent attacks even in an isolated area, let alone in an extensive teak forest. On page 50, this very insect is said to pupate on the ground and, on the next page, we are told that the best way to destroy it is to fire the forest; the prescription may be all right for a small area where the fire can be kept under absolute control and where conditions of the ground-cover lend themselves to such control but, ordinarily, such a method would be out of the question and its application over an extended area would

surely be fraught with far more disastrous effects than could possibly accrue from the attack of the pest. Besides, *Pyrhausta machæralis* larvæ do not by any means all pupate on the ground. They do so under webs on the leaves themselves, and the moth emerges before these fall; or in crevices in the bark of the trees, and that at all heights. We might mention that pupæ of *Hyblæa*, mentioned on the same page, are also found, as often as not, in cells made on the leaves.

On page 63, at the top, we find the statement that a large species of *Elater* is found in dead *Xylia* trees and the fact is mentioned in connection with wood-boring beetles. We do not know any wood-boring beetles belonging to the *Elaterdæ* though a number of them live in decaying, nearly rotten wood; there is a very large species which lives in *Tamarix* in Sind, where it is predaceous upon a prionid larva.

Anthia sexguttata mentioned on page 173 will kill and eat anything it can master. It is not, generally, a forest species, however; being far commoner on black cotton soil in the plains and open places than in forests. Many larvæ of the malacodermatous fireflies (page 180) feed upon snails, and a large one we are acquainted with will demolish four of considerable size in a single day; so that they might be considered to be of some use to plant-life in destroying one of the enemies thereof. *Belionota prasina* (page 217) attacks *Terminalia paniculata* and *T. belerica* in the Bombay Presidency, as well as other trees. *A propos* of the Family *Cantharidæ* (page 246) nothing is mentioned about the interesting life histories of which several have been fully described by Fabre and others. The species are seemingly all parasitic and their hosts are bees, wasps or grasshoppers of different kinds. The eggs are generally laid in the earth, in little pits made for the purpose, which are afterwards filled up by the mother-beetle and then left to themselves. After a time each egg gives birth to a curious, extremely, active, little larva, known as a *triangulin* from its legs each ending in three claws. These run about on the surface of the ground or climb up into flowers, etc., until, in the latter case, they meet a bee, into the hairs of whose body they can fasten; or, in the former case, until they can burrow into a nest of some particular species of wasp or into the egg-chamber of some grasshopper. The bee carries the little larva away with it to its home where the latter gets on top of an egg, which has been laid on the honey. It sticks to this egg until it has fully consumed it, carefully avoiding contact with the liquid; then it changes into a comparatively formless grub of a quite different shape, adapted to float. Consuming all the honey thus, it changes into a pseudo-pupa, then into an active-looking larva again and, subsequently, into a true pupa before emerging as a beetle. The bees selected are, as far as is known, such as make nests in the earth. The development follows the same sequence in the case of larvæ that burrow into the egg-nests of locusts. *Mylabris** will probably also burrow as *triangulin* into the soil though it is not known upon what eggs it feeds. *Cissites* (page 249) is found in the larval state in nests of species of *Xyloccpa* in India. Whether the eggs are laid actually in the borings made by the bees; or whether they are laid in the earth as in other species, giving birth to similar active larvæ which climb up into flowers from which the bees rifle the pollen to make their honey, is not known. It would be interesting to know. It is probable that the genus *Xylocopa* generally is subject to attack by both the species of *Cissites* mentioned as, in Sind, *testaceus* was found in the borings of a different species to *latipes*. The fact that the beetles of the genus *Cantharis* (*Epicauta*) are found in great numbers in one spot will, we think, be found to depend upon the insect upon which they prey existing there in large numbers combined

* Mr. Bainbrigge Fletcher in "Some South Indian Insects" ust published notes that *Mylabris* sp. actually does this.

with an equal period of development for the individual beetles. It has been observed that many species do occur in enormous numbers together here in India though we cannot, off-hand, remember their names. We remember, however, to have seen hundreds and hundreds of perfect insects of *Cissites debyi* of all sizes crawling about the ground in Khandesh in the year 1902—all in one place, in the month of April.

Estigmena chinensis (page 254) is also found in Bombay where it is extremely common in the bamboo jungles, attacking, as mentioned, *Dendrocalamus strictus*. The bamboo is, however, so plentiful that its depredations are of little consequence. Its habits are as stated by Mr. Stebbing. The genus *Crioceris* affects Lilies to a great extent; *Cryptocephalus* eats the leaves of many different trees. The larvæ are soft grubs and the latter lives in hard, spherical or ovoid cocoons while the former covers itself with a soft covering of its own excreta. There is a *Haltica* (page 261) that is very common in Bombay in the hills in forest country; it frequents hot nalla-beds and feeds on the leaves of *Homonoiariparia* and *Salix ichnostachya*. It is sometimes found in such numbers that the underside of every leaf of the thickets of bushes in spaces of 100 sq. yards is absolutely covered with them. The species is known but, in the absence of notes, cannot be given here. *Aspidomorpha sanctæcrucis*, like others of the genus, will be found on all *Convolvulaceæ*, on the underside of the leaves on which the larvæ feed. These larvæ are of the ordinary form, with processes, and an upturned, fan-shaped brush of excreta shading the back. *Sthenias grisator* (page 377) attacks the branches of *Chloroxylony swietenia*, the Satinwood tree, in Bombay, ringing them as described, so that they fall to the earth; branches of nearly an inch in diameter are thus killed and much damage done to young stool-shoots. *Larinus*? sp. (page 411). This is probably the same beetle as the one described, by Dr. Heller of the Dresden Museum in the year 1902, from larvæ and beetles procured in Khandesh. The name is again wanting in the absence of notes. *Cyrtotrachelus* (page 440). There is a species of this occurring commonly in the south of Bombay which is probably the same as *longipes* that attacks bamboos; also another one, black in colour.

Now we come to the *piece de resistence* of the book—chapters XX and XXI, treating of the family *Scolytidæ*. These chapters are really good and nearly altogether original: descriptions, life-histories, parasites and all. And Mr. Stebbing is to be particularly congratulated upon having brought the study of so many species of small insects of all but exclusively forest importance to so advanced a stage. He enumerates 76 species—some of them, it is true, not complete as to identification or description, but these are in the large minority—of which he has discovered and described no less than 44 himself. The treatment of this family alone justifies the publication of his work in the present form and affords ample evidence that he made good use of the time he was able to devote to entomology in India.

There are two misprints in the book; one on page 16, line 7 from the bottom where *Bistria* is a mistake for *Biston*; the other on page 18 where *mangiferæ* should read *mangifera* in the second line.

MISCELLANEOUS NOTES.

No. I.—NOTES ON THE HABITS AND COLOURATION OF THE WHITE-HANDED GIBBON (*HYLOBATES LAR*, L.).

Blanford notes that *H. lar* is said to drink by scooping up water with its hand, but all the specimens I have seen in confinement drank in the ordinary way by putting their lips to the water.

The brown form was the most numerous in this District, only about one in ten being black, while none of the very pale or bright yellow varieties were observed. In *lar*, black individuals may be either males or females, but as Blanford notes, in 'hoolock' black males and brown females appear to predominate. In Western Australia male red kangaroos (*Macropus rufus*) are normally red and the females greyish-blue, the females however are very frequently red, and the males may occasionally be blue. Towards the North-West the 'blue doe' entirely disappears, both sexes becoming similar in colour. It is just possible that the variable colouration of the gibbons may be analogous in a still more irregular degree.

But I think there is little doubt that the black individuals that occur both in this species and 'hoolock' are melanistic, and that brown is the normal colour in both sexes. The white eyebrows in 'hoolock' and the white circle, hands and feet in *lar* being, like the tail tip of an Australian opossum, characters that are not affected by melanism.

It may be noted that the black varieties of both the grey and ring tail opossums are most plentiful in the thick coastal belt of South-Western Australia, while even the common grey kangaroos are distinctly darker within that tract. In India the panther is without doubt most frequently melanistic in the forest, especially the evergreen forest regions, black panthers being in the Peninsula extremely rare away from the thick jungles that clothe the Western Ghats—much of which is evergreen, they become more numerous however to the East of Bengal and still more so in the evergreen tracts of Tenasserim and the Malay countries. The forest dwelling gibbons are possibly affected in the same way as the panther, while the black forms of *Ratufa* occurring to the East of Bengal, Ceylon and the extreme South of India may have originated in a similar manner though in this case the changes have become specific. What influence evergreen forests can have in encouraging melanism it is difficult to say, but it may have something to do with the much greater darkness or the constantly moist atmosphere and greater rainfall. At all events I believe that for some unknown reason there is a distinct tendency for many Indian mammals to become melanistic in evergreen forest areas, especially as the Malay countries are approached where the forests are entirely evergreen.

G. C. SHORTRIDGE.

Rangoon, 1914.

No. II.—THE WHITE-BELLIED FLYING SQUIRREL IN GARHWAL.

I see in report No. 15 of the Mammal Survey a note on *Petaurista albiventer* in which it is stated that this species is exceedingly local.

If I am not mistaken in the species—and I think I am not—I think the above is hardly correct. Presumably Garhwal is not included in the writer's interpretation of Kumaon, but it adjoins it and if *P. albiventer* is common here it must be common there.

In Garhwal this squirrel is very common, I should say wherever forest of *Q. incana* and *Q. dilatata* abounds, though it is local to the extent that it moves about wherever its food happens to be, which I believe is principally acorns.

A month ago I camped in a forest at 8,000′ which was simply swarming with them—eating acorns of the above two species and as I had never before shot one I shot three, all males.

I took their measurements if they are of any interest to you—

Total length to end of tail without hair ..	32″	30″	32½″
Tail only without hair..	15½″	14½″	17″
Weight in lbs.	2¾	2½	2¾

I kept the skins and two skulls and if you thought the above of sufficient interest and that there should be any doubt as to its correct identification I could send a skin and skull for you to see though I could not do so for some months as I sent away these skins in a box to Naini Tal to await my arrival.

In Naini Tal there is another species of flying squirrel, grey all over as far as I remember and less than half the size of *P. albiventer*.

A. E. OSMASTON.

Camp *via* Pauri, Garhwal,

25*th December* 1914.

[The Society's collector only collected in Kumaon, principally in the eastern part. Mr. Osmaston has sent a skin which is certainly *P. albiventer*. The smaller species is probably *Sciuropterus fimbriatus*, but no specimens were obtained by Mr. Crump.—Eds.]

No. III.—NOTES ON TIGERS IN TENASSERIM.

In the tiger, recorded in the Tenasserim Report, a porcupine quill was found, nearly four inches long, entirely embedded in the back of the head. Porcupine flesh appears to be very attractive to tigers and panthers and the scattered quills of examples that have been killed and eaten are quite frequently found in the jungle. I have also occasionally found remains of pangolins which were probably killed by the same animals. It is curious how unsuspicious tigers become where they are not much shot. In the present case a half grown buffalo had been killed and in the course of the following day the carcase was entirely stripped by vultures, nothing but the skeleton being left. When I arrived I found that the bones had been gathered together, tied into a bundle with rope and dragged nearly a hundred yards to the foot of a clump of bamboos in which a "machan" had been built. The buffalo had been in open "Taungya" country and there was no other cover for several hundred yards with the exception of a belt of low scrub. The tiger came to the kill at about 5 p.m. and dropped to a lethal bullet which entered the neck at an angle and smashed the far shoulder blade. On another occasion near Bankachon two hurricane lamps were left on the ground, as the moon was rising late, one on either side of a kill, in order to keep the tiger away during the early part of the night. When the tiger arrived, however, it dragged the kill away, evidently taking no notice of the lamps.

G. C. SHORTRIDGE.

Rangoon, 1914.

No. IV.—ALTITUDE TO WHICH ELEPHANTS ASCEND.

In your current issue Capt. Molesworth asks if elephants have ever before been observed at 10,200 ft. elevation. Though I have never seen them myself, a number of people who know the Kalimpong district have told me that elephants are frequently seen on Rechila at high elevations and the following note in the margin of my copy of the "Fauna of British India" may be of interest. The book originally belonged to the late Mr. Tinne of the Forest Department and the note is in his handwriting:—

"They (elephants) go at all seasons of the year to the top of Rechila and Sathila in British Bhutan, 10,060 ft., to feed on the Maling bamboo (*Arundinaria racemosa*) and I think, to escape the mosquitoes and other pests in the Dooars. I have found fresh tracks at most seasons of the year, even through 2 ft. of snow in April 1907 when the season was unusually late. As the approach to the summit is extremely steep they must have a regular track, probably crossing from side to side of the Neora (Narchu) river. From the tracks they appear to wade into the ponds found at 9,200 ft. but not extensively. They probably also graze on the small grassy meadows which cap Rechila where bamboo and rhodadendron grow."

E. O. SHEBBEARE, I.F.S.

JALPAIGURI, BENGAL, 15*th December* 1914.

No. V.—THE GREAT PAMIR OR MARCO POLO'S SHEEP (*OVIS POLI*).

"Ye emperors, kings, dukes, marquises, earls, and knights and all other people desirous of knowing the diversities of the races of mankind, as well as the diversities of kingdoms, provinces, and regions of all parts of the East, read through this book, and ye will find in it the greatest and most marvellous characteristics of the peoples especially of Armenia, Persia, India and Tartary, as they are severally related in the present work by Marco Polo, a wise and learned citizen of Venice, who states distinctly what things he saw and what things he heard from others. For this book will be a truthful one." So wrote Rustigiela, a citizen of Pisa, at the dictation of Marco Polo, in A.D. 1295, both being then prisoners of war in Genoa. In A.D. 1324, Marco Polo lay upon his death bed, being then some 70 years of age, and was exhorted by his friends as a matter of conscience to retract what he had published, or at least to disavow the parts that were fictitious. He then said that so far from having exaggerated, he had not told one-half of the extraordinary things of which he had been an eye-witness. This claim has been fully substantiated by every traveller who has traced the footsteps of the great Venetian, but to this day little more is known of Marco Polo by the majority of my countrymen, than that his name was given to the great sheep which is the subject of the present article, and his travels are placed in the same category as those of Sir John Mandeville, and de Rougemont. Yet those travels contain all that is known about an empire that once extended from the Black Sea to the Pacific, and from the Arctic into Burma. The tide of its conquests spent its force among the myriads of China and India, and it is now hard to realise that in the 13th and 14th centuries there was a destructive force at work in Northern Asia, which might have exterminated the entire population of Europe.

In the course of his journey from Persia to Pekin, Marco Polo crossed the mountain range that lies between the head-waters of the Oxus and the City of Kashgar. "Here, between two ranges, you perceive a large lake.

from which flows a handsome river, that pursues its course along an extensive plain, covered with the richest verdure. Such indeed is its quality that the leanest cattle turned upon it would become fat in the course of ten days. In this plain there are wild animals in great numbers, particularly sheep of a large size, having horns three, four, and even six palms in length. Of these the shepherds form ladles and vessels for holding their victuals; and with the same materials they construct fences for enclosing their cattle, and securing them against the wolves, with which they say the country is infested, and which likewise destroy many of these wild sheep or goats. Their horns and bones being found in large quantities, heaps are made of them at the sides of the road, for the purpose of guiding travellers at the season when it is covered with snow. For twelve days the course is along this elevated plain, which is named Pamir; and as during all that time you do not meet with any habitations, it is necessary to make provision at the outset accordingly. So great is the height of the mountains, that no birds are to be seen near their summits: and however extraordinary it may be thought, it was affirmed that from the keenness of the air, fires when lighted do not give the same heat as in lower situations, nor produce the same effect in dressing victuals." Carlyle remarks that the traits which were noticed by Julius Cæsar among the Gauls, were to be found among the French at the Revolution. At the present day near the head of the Taghdumbash Pamir is a camping ground called Kukturuk. Thence a river flows the entire length of that Pamir. Ten miles below Kukturuk close to the left bank of that river is a sheepfold, and it has pleased the Kirghiz who constructed that sheepfold to make its walls entirely of the horns of *Ovis poli* twisted in among large boulders. This is good evidence of the truth that Marco Polo wrote.

The Pamirs can easily be reached from Europe by means of the Trans-Caspian railway, but I know nothing about this route.

The only other practicable way of reaching the Pamirs is from India. There are two feasible routes, *via* Gilgit, and *via* Leh and Yarkand. However the Leh route is so long and the passes open so late in the year, that it would really be waste of time for any sporstman to attempt to shoot on the Pamirs unless he has obtained permission from the Government of India to travel *via* Gilgit. The shorter journey is also infinitely more beautiful and interesting than the longer one.

I regret to say that game on the Taghdumbash Pamir is now very scarce indeed. The game list comprises *Ovis poli*, ibex, wolves, bear, and snow leopard, and the two last are so rare as scarcely to count, and although I travelled all over the Pamir, I only saw one decent herd of ibex, which was in the Paik Nullah. I calculate that on June 1st, there would be 200 head of *Ovis poli* on the Pamir, of which 50 would be in the nullahs round Kukturuk, 50 in the Paik Nullah and 100 in the Kunjerab. It is an interesting fact that two miles of the head of the Kunjerab Nullah are in British territory, so that *poli* is a permanent resident of our Empire. The record *poli* head is 75 inches, and the sportsman is allowed to shoot 4 heads. However he will be most fortunate if he shoots a single head of 50 inches, and I would not hesitate to shoot anything of 45 inches. I myself only secured a single head of forty inches in 5 weeks, and only missed once, so that it is open to ask whether the game is now worth the candle. On the other hand my companion got two heads of over 45 inches in ten days, and heads of 50 inches are still to be had. The reason for this is obviously overshooting. Guns are not much in evidence in the summer, but the winter is the shooting season for the Kirghiz and one sees skulls literally by the hundred that one would give anything to possess as a legitimate trophy. Indeed one

need only visit the Pamirs to understand how a species becomes extinct. My own opinion is that about 20 out of those 200 heads will be 45 inches and over. The rest will be immature males as it is a singular fact that scarcely a female lives on the Taghdumbash. This separation of the sexes is a peculiarity which *poli* share with the Tibetan antelope and markhor, but among markhor the sexes at least occupy the same valley. My 40 inch *poli* weighed 237 lbs., stood 45 inches, and was 81 inches in length, of which 4 inches was tail. The colour is a sort of bluish-fawn, with a good deal of white, which rather gives him away. They frequent the grassy slopes at the very heads of the valleys, right under the glaciers. Their senses of sight, smell and hearing are most acute, and although the ground on which they live is not usually difficult, they generally frequent open spaces, where it is hard to approach within less than a quarter of a mile. Like all hill game they are best stalked from above if it is possible to manage it. They generally feed until 10 A.M. when they lie up until 4 p.m., usually on the feeding ground unless they have become suspicious. I never saw them singly, but a herd may be anything from 4 up to 20, and often consisted entirely of small heads. When scared they go up hill, and although their tracks are obvious enough, they travel so far that it is not worth while to follow them. One should leave one's camp as soon as it is light enough to see, as it is easier to stalk them when they are feeding than when they are lying down. One always rides a yak until one has seen one's game, and hillmen have such keen eyesight that it is rare to jump a herd. When one has sighted the herd it is most difficult to tell the size of the heads. The horns are so pale in colour as to be almost invisible and look smaller than they really are. A 40-inch head makes approximately a full circle, and anything better than that is worth shooting. They have a habit of digging shallow pits to keep out of the wind, but are cute enough to keep their eyes above the ground level. When at rest the various members of the herd graze in all directions, and they graze up wind, so always seem to feed away from one. The Paik Nullah, where I first went, seemed to me particularly unfavourable for stalking, owing to the large open spaces and lack of ravines. The Kukturuk nullah is easy stalking ground, but I saw next to nothing there, though a previous sportsman had missed a big head. If I had my choice now, I would take the Kunjerab, as the ground is fairly good for stalking, and there is enough ground and enough game for ten days shooting, whereas one would have scared all the game out of the Paik Nullah or Kukturuk in less than a week.

W. B. COTTON, I.C.S.

BASTI, U. P., 23*rd November* 1914.

No. VI.—THE ASIATIC TWO-HORNED RHINOCEROS (*RHINOCEROS SUMATRENSIS*, CUV.).

As far as I have been able to find out *Rhinoceros sumatrensis* and *sondaicus* occur in Southern Tennasserim in about equal numbers, and the many enquiries I have made seem to show that both species are equally well known to the natives, while they appear to exist in the same situations and to be similar in habits, although in the Dutch Indies I was always told that *sondaicus* was much more of a mountain animal than *sumatrensis*. Besides the Rhinoceros I shot I have only heard of two other instances of a Rhinoceros being shot near Victoria Point by a European, one of these specimens, of which I have seen the skull, was *sondaicus* obtained some years ago by Captain McCormick, a former planter in the district, but it is only

too well known that they are persistently hunted by Siamese and Chinese shikaris, who shoot them over water holes during the dry season for the sake of the valuable medicinal properties they are supposed to possess, which without doubt accounts for their scarcity, the thick jungles and comparatively sparse population where they still exist being probably the only things that have prevented their extermination long ago. One Siamese shikari near Victoria Point is said to have accounted for *sixteen* Rhino, probably a very high percentage of those existing in the whole district. The continued watch a native shikari is able to keep over the water holes throughout a considerable area must cause tremendous destruction among these animals and a dead Rhino is said to be worth Rs. 1,000, a fortune to most shikaris. Unfortunately, as in other places, although game laws are enforced strictly enough among Europeans, they are quite unable to cope with the secrecy with which a native is able to carry on his hunting, and although there may not be a large number of guns in the district, if there is only one in a village it is idle to suppose it is not at the disposal of any one who wants it.

The Chinese, Burmese and Siamese preserve practically every part of a Rhinoceros. The horns, hoofs, blood, urine, hide and even the intestines being dried and afterwards converted into various medicines.

Rhinoceroses are said to occasionally swim from the mainland to some of the islands near the coast, but which species, or whether both, do it I have been unable to find out. I have been told that once as many as eight were seen together on one of these islands, but this must have been a very exceptional instance, as in addition to their scarcity I believe them to be rarely, if ever, intentionally gregarious, going about as a rule in pairs and possibly often wandering about singly, although a pair will probably keep in touch and meet in the course of the night.

For its size a Rhinoceros does not leave a big track although easy to follow owing to the pits made in the ground by their toes. I had many opportunities of following and observing Rhinoceros tracks both at Bankachon and Maliwun. The usual thing is evidently for a pair to frequent a district for a month or so, and then to move off somewhere else, their movements being probably affected by the water-supply. They apparently do not care for clear running streams and are said only to visit the low ground during the hot season when their drinking pools in the hills have dried up. Where there are plenty of well beaten tracks 'wallows' will occasionally be found which besides being drinking places are used for rolling in, owing to which habit they are always covered more or less thickly with a coating of mud which probably serves as a protection against mosquitos. Two 'wallows' found were quite small, more or less oval in shape, about 8 feet by 6 and full of stirred up mud, one near Maliwun had evidently been much used and deserted quite recently having probably got too dry. Tracks led off in all directions, the surrounding jungle was very thick and the tracks presented the appearance of large tunnels, while the trunks of standing and fallen trees and even the undergrowth for several hundred yards in every direction were white with dry caked mud, which had been rubbed off by the constant passing backwards and forwards of at least a pair of these animals.

The track made by a Rhinoceros is quite different to that of an Elephant. Where an Elephant will break a path a Rhinoceros will make a tunnel, even creepers three or four feet from the ground stretching across their path will not be broken but burrowed under.

They are evidently largely ground feeders, a number of large citrous fruits resembling oranges, merely bitten in half and swallowed, being found in the stomach of the specimen shot. With the exception of these, the stomach contained green vegetable matter, probably the fallen leaves of the same tree.

They may also feed on bamboos, but in their feeding places there is not the same amount of broken down vegetation as there is where an Elephant has been feeding.

On January 7th, two Gurkhas and I who had been doing a lot of hunting in the district, although not previously succeeding in finding any fresh Rhino tracks, came upon some that were evidently more recent than any thing else we had seen. We followed them for a few miles going slowly as in several places we came to where the animal had evidently been feeding as the tracks would circle about and cross themselves in every direction. Towards evening, as we were about five miles from camp, I decided to camp where we were for the night and follow on again next morning, half hoping that something would turn up during the night, as besides Rhino we had noticed tracks of Elephant, Sambur and Pig. It must have been well after twelve, as the moon which was very small had almost set and we had turned in having given up hopes of seeing anything that night, when we were awakened by a series of loud snorts which we at once guessed must be from a Rhino, that sounded quite close, although when first heard they were probably over a hundred yards off. The animal must have scented us or been suspicious of something from the very first, though as there was no wind it was quite unable to locate us. If it had done so it might have made straight off, instead of which it began making a series of short rushes, crashing into trees and altering its direction so often that it was difficult to tell if it was gradually coming our way or not; between each rush it would become quite silent for several minutes, probably listening, and then start off in some new direction, at one time we were able to locate it exactly, as the path a short distance away was partly under water and we heard the splashing as it crossed this spot, but although so close there was so little light that we were unable to see anything and for a short time it apparently increased its distance from us. It is astonishing how quietly even a Rhino can move when it chooses, as at last without any warning it suddenly crashed out of a bush almost on top of us. As the moon had almost set it was impossible to see the sights of my rifle so I was depending on a shot gun loaded with lethal bullet and dropped him at 7 paces with a lucky shot in the head, which smashed through the zygomatic arch and into the skull, the bullet being afterwards found inside the brain in about a dozen pieces, several of the circular steel discs used in the construction of the bullet having entirely detached themselves from the lead covering.

Several hours later when we had turned in for the second time we were awakened in exactly the same manner by a second Rhino, the snorts however coming this time from another direction, the moon had been down for some time and it was impossible to see a yard. This animal did not rush about like the first one but came along the track and had just crossed that part which was under water, when it must have either seen some movement or scented the dead Rhino, as it turned suddenly without the slightest warning and bolted, crashing through branches and hitting its feet against stones and tree trunks as it went, making as much noise as an Elephant, and on getting about a hundred yards away, it started squealing in a most extraordinary manner, the noise very much resembling that made by a dog caught in a trap.

The next day we found a 'wallow' a few hundred yards off which the tracks we had been following evidently led to.

The meat was most excellent, very like beef and remarkably tender, and not at all coarse or stringy like that of a sambur or a bison.

G. C. SHORTRIDGE.

RANGOON, 1914.

No. VII.—OCCURRENCE OF THE BARKING DEER (*MUNTIACUS VAGINALIS*) AND A FEW OTHER ANIMALS IN KATHIAWAR.

I notice in Report No. 10 of our Society's Mammal Survey of India, that it is stated by Mr. Crump, the Collector, that the Barking Deer is found in the Gir, and that one evening he heard one barking (*vide* page 471, Vol. XXII, No. 3, of the Journal).

I am quite confident that Mr. Crump must have been mistaken, for at different times, I have camped for weeks together in the Gir, where I was continually wandering through every nook and corner of it, but I never came across, or even heard, of a Barking Deer. I have also spent many weeks in the Girnár, the Barda Hills, and the Tánga or jungle country around Chotila to the north and west of Rajkot, but everywhere, the deer in question, was conspicuous by its absence.

The Four-horned Antelope (*Tetraceros quadricornis*) which in the local vernacular is called *Guntâda* (not *Guntla*) is common enough in the Gir, but the bucks rarely carry more than the two posterior horns. The latter are also to be found in the Girnár and the Barda Hills, but are comparatively scarce in both these localities.

Mr. Crump also remarks that he was unable to obtain any information regarding the Ant-eater (*Manis crassicaudata*). They are exceedingly scarce, but *are* to be found in Káthiáwár. I only saw one during the 17 years I was there, which was brought to me by a local *Wágri* at Rájkot.

Another animal of which Mr. Crump was unable to obtain any information, is the Hunting Leopard (*Cynælurus jubatus*). I have never heard of one in the Gir but it is hardly the kind of country they prefer. The only localities where I have heard of their ever having been seen or shot, are in the Tánga country extending from Thán under Lakhtar, eastwards through Chotila, Chobári Bábra, right away across Jasdan Somnath, to the neighbourhoods of Vinchia and Tasdan. Mr. S. A. Strip of Wadhwán Camp shot one some 20 miles or less south of Wadhwán. The only live ones I saw during my sojourn in Káthiáwár were two which I helped to spear in the neighbourhood of Rajkot where they had undoubtedly wandered from the districts I have already mentioned.

L. L. FENTON, Lieut.-Col.

Marsh Hall, South Molton,
N. Devon, 23*rd November* 1914.

No. VIII.—THE BALEEN OF THE GREAT INDIAN FIN-WHALE (*BALÆNOPTERA INDICA*).

In the last number of the Society's journal mention was made of a whale (*Balænoptera indica*) which was stranded at Viziadrug in the Ratnagiri District. Mr. Crump, as was mentioned, was sent to obtain measurements of this whale but unfortunately it was too far gone for him to obtain any. He however brought back a number of blades of baleen and the accompanying block is a photograph of some of these blades. The largest blade measures about 26″ in length, the bristles being about 7″ more and the breadth at the base is about 9″ and in colour it was bluish-black. Numerous illustrations of the baleen of different whales have been published but we have not access to any at present except the one which appeared in Mr. Orjan Olsen's paper on the newly described S. African whale (*Balænoptera brydei*), Bryde's whale, in the P.Z.S., 1913, p. XII. This plate shows that the bristles of the

common Rorqual (*Balænoptera borealis*) are very different to those of *B. brydei*, in the former the bristles are comparatively short and much curled while in the latter they are longer, thicker and quite straight. In the accompanying block it will be seen that in this respect the baleen of *B. indica* resembles much more closely that of *B. brydei* than *B. borealis*. In shape also the baleen of *B. indica* seems to resemble that of *B. brydei*. Mr. Olsen suggests that on account of the coarseness and shape of the bristles of *B. brydei* "it would hardly be possible with its imperfect straining apparatus to keep back such small crustaceans as the *Calanidæ* which form the principal food of *B. borealis*." He also mentions that the food of *B. brydei* consists chiefly of fish, usually a variety of the herring, but that it also takes small sharks and one Captain reported to him the finding of 15 large penguins and a gannet in the stomach of a Bryde's whale.

N. B. KINNEAR.

Bombay, 30*th March* 1915.

No. IX.—THE ORANGE-BELLIED CHLOROPSIS IN THE KATHA DISTRICT, U. BURMA.

I saw a pair of these birds, which I afterwards shot, in a tall tree in evergreen and bamboo jungle 2,000 ft. up in the hills some 20 miles east of Wuntho station, Katha district; they were apparently feeding on insects among the leaves and my attention was drawn to them by the twittering whistle they were making, very similar to that of the other chloropsis. I have not seen any more of this species. Harington records this bird as occurring in the Upper Chindwin, but he does not mention it in his Bhamo lists.

C. E. MILNER, I.F.S.

Shwebo, 20*th January* 1915.

No. X.—THE KING VULTURE (*OTOGYPS CALVUS*) IN SIND.

I found the nest of the King Vulture to-day. The bird was sitting on it. I hunted her off and found a young bird in the nest. The nest was built in the top of a small dead babul tree about 35 feet from the ground. The tree was close to an old bed of the river Indus, in which there was still some water. It was in the Murid Rais forest of the Hyderabad Division.

My reason for communicating the above is that Murray (Vertebrate Zoology of Sind) says of this bird, "said to breed on inaccessible cliffs from January to April", and Barnes does not seem to have found a nest in Sind.

E. G. OLIVER,
Dy. Conservator of Forests.

KARACHI, *March 17th*, 1915.

[Many of the statements in Murray's Vertebrate Zoology of Sind are not to be relied on. Dr. Jerdon in his Birds of India wrote that this species "is said to usually breed on inaccessible cliffs" and though this statement was hardly correct it was copied into the "Vertebrate Zoology of Sind," The King Vulture nearly, if not always, nests in trees, sometimes even on bushes where there are few trees. In the Eastern Narra the King Vulture was not uncommon as a breeding species in Doig's time.—EDS.]

No. XI.—WOODCOCK (*SCOLOPAX RUSTICULA*) IN THE EASTERN GHÂTS.

The enclosed photographs will no doubt interest you.

The birds were shot at Salabam, which is situated on the Eastern Ghâts, at an elevation of about 4,000 ft., Lat. N. 18°-10′, Long. 82° 45′, on 26th February by Mr. L. T. Harris, I.C.S.

He was just about to photograph a little pool in the jungle when his peon called his attention to the woodcock and he hastily exchanged the camera for his gun, and was lucky enough to get it.

P. H. ARBUTHNOT.

VIZAGAPATAM, *5th March* 1915.

[We are unable to reproduce the photograph of the Woodcock. There are few records of Woodcock on the Eastern Ghâts so this note is of considerable interest.—EDS.]

No. XII.—SNIPE IN LOWER BURMA.

A few notes on the Snipe season in Lower Burma during the year 1914 might be of interest. The season was very poor. According to my diary, there appears to be a steady decline since 1909-10, these two years having been excellent. In 1913, birds, especially "fantail," stayed very late. On the 30th November I got 26 couple, in two short outings in December 28 couple, and at the beginning of 1914, on the 24th January, a couple of hours produced 26 couple; my last few snipe (5 couple) being shot as late as 10th April. I saw 3 or 4 birds on the 26th April, but lost the one I had managed to get in thick jungle. Towards the end of August birds started arriving, rather later than usual, as the 13th might be taken as average for the last seven years. Owing to a record rainfall most of the grounds were under water, and on the few higher situated fields birds were few and very wild. I believe only one good bag of 51½ couple was obtained by one gun, on the

11th October near Ledaunggan, when mostly pintail, but also a few fantail were found plentiful on the banks of certain little creeks near the Poozoundanag Creek.

Sundry "late" grounds, which invariably are good in December, are still too wet, even at time of writing, but another fortnight's sun should dry them up sufficiently, and probably a few small bags will be obtained then.

I saw, and obtained, several Swinhoe's Snipe (*G. megala*), though on the whole they are rare; I am inclined to believe that they show a decided penchant for jungle grounds. The last I shot, 26th December, was obtained near Palon, about 50 miles up the Prome Railway line, on the edge of a large jheel (Hlahamahget-su), situated in the middle of thick jungle, and I obtained here also, on that day, a Wood-Snipe (*G. nemoricola*); this latter species is also none too plentiful here, being only the second that I have shot during the last ten years. I once saw another, but missed. Jack-snipe are still rarer, I fancy, as I have only seen one, which I got near the Poozoundanag Creek on the 14th September 1910.

In my mind I am quite certain that, given favourable conditions, snipe breed in Lower Burma occasionally, though I have not yet succeeded in finding a nest. I have however shot on several occasions early in the season quite young birds with plumage not sufficiently developed to enable them to travel any distance; besides, these young birds were in excellent condition, whereas the first arrivals in August are invariably on the "light" side. I have not kept any skins, but shall make a point of keeping one or two (provided I come across them) this year, and forward them to you in proof of my argument.

E. O. BLOECH.

RANGOON, 20*th January* 1915.

No. XIII.—THE COMPARATIVE WEIGHTS OF FANTAIL AND PINTAIL SNIPE.

The question of the comparative weights of Fantail, *Gallinago cœlestis* and Pintail Snipe, *G. stenura* was recently under discussion. My experience of these in Southern India is that the Pintail appears to be the bigger bird. One man said that the authorities (he referred to the Fauna of British India) on the subject did not bear this out. I find that in Hume and Marshall's "Game Birds" the average weight of both sexes of Fantails is given as 4·2 oz. (Vol. III, p. 369) while that of Pintails is given as 4·06 oz. (Vol. III, p. 356).

Curiously enough on the former page there is a note from a Mr. J. C. Parker in which he gives weights which makes out the Pintail to be on the average 1 oz. heavier than the Fantail. Mr. Hume, however, does not seem to have been much impressed.

Jerdon's Birds of India, Vol. III, p. 675, gives the weight of Fantails as ranging from $3\frac{3}{4}$ to 5 oz. but gives no weight for Pintails. The weights given in Vol. IV, pages 287 and 290, of the Fauna of British India are said to have been taken from Hume and they agree with those given.

Finally on pages 549 and 579 of Volume XX of the Bombay Natural History Society's Journal, the weights are given as from Hume.

It would be interesting to find out if this difference in weight varies with different localities. I have been weighing these birds recently, and the average weight of 135 Fantails comes to 3·513 oz. while that of 472 Pintails

comes to 4·014 oz. The birds have been weighed on return home about 5 p.m. generally in groups of four on a parcels balance which can be read to about $\frac{1}{4}$ oz.

The average weight throughout the season will also be ascertained to see if there is much variation.

R. F. STONEY.

MADURA, S. INDIA, 18*th January* 1915.

No. XIV.—GHARIAL, *GAVIALUS GANGETICUS*, AND PORPOISE, *PLATANISTA GANGETICA*, CATCHING IN THE INDUS.

I do not know whether any account of the Gharial (long snouted Crocodile) catching people of the Indus has ever been published, but in case it may be of interest I send you an account of an experience I had a few days ago.

Knowing that I wished to see the tamasha, my men sent for some Kehals to my camp on the bank of the river. About 300 yards away was a sandbank at the down stream end of which the Kehals staked some nets, these did not show above water, were only some 2 or $2\frac{1}{2}$ feet deep and did not seem to be particularly strong; two Kehals then went and concealed themselves some little way up stream. Not very long after, one by one, 3 gharials came out to sun themselves on the sandbank. After waiting in vain for a little for more to come the two Kehals showed themselves and the gharial darted into the water, the Kehals raced up and seized on their nets and hauled out two of the three, small ones, but they assure me that their nets will hold the very biggest.

I was also told of their method of catching porpoises which I did not attempt to see for myself. The *modus operandi* is as follows:—A spot where the water is about 4 ft. deep and the current not strong is selected and a platform is erected. At sunset the fisherman takes his post on the platform accompanied by a tame otter and armed with a casting net, a stake and a live fish—the stake is fixed at a convenient distance from the platform and the fish is tethered to the stake. The tame otter seeing the live fish cries for it and it is allowed to go into the water but not to reach the fish. According to the Kehals the porpoise hears the otter call or smells it and comes to help in its fishing—it then sees the tethered fish and, losing all caution in its anxiety to get to the fish before the otter, makes a dash and gives the fisherman the opportunity to cast his net over it. This sounds a good fisherman's story but they assure me that success is by no means infrequent.

R. M. LOWIS, LT.-COL.

DERA GHAZI KHAN, *January* 1915.

[Hume in *Stray Feathers*, Vol. 2, says that he was told in the Punjab that the otter was tied to a post in the water and that the porpoises were caught as they came to attack it! Later he found that this story was made up and an intelligent Mhor told him that when a herd of porpoises were located at night, a tame otter was made to work the water, like a dog, and drive all the fish towards the bank. The porpoises seeing the fish dash at them and are caught by men standing in the water with a special kind of net.

Any member in the Punjab or Sind who has seen porpoises caught might send us a note for the Journal, as no first hand account of their capture has as far as we know been published.

The Society also is much in want of skeletons and skulls of this porpoise.—EDS.]

No. XV.—NOTE ON THE 'MUGGER' *CROCODILUS PALUSTRIS*; CONTENTS OF THEIR STOMACHS, FOLKLORE, Etc.

The following are the records of the contents of the stomachs of two specimens shot in the Bilaspur District, Central Provinces.

A small specimen 4'-5" long inhabiting a Jheel contained the following:—

32 Water Beetles, *Cybister confusus.*
15 Giant Water Bugs, *Belostoma indicum.*
4 Opercula of *Ampullaria.*
14 Paddy grains.
16 Small stones.

A large specimen 10'-8" long (tail docked) inhabiting the Twlsua Nuddy and which was shot in the afternoon, only contained the following :—

1 Large Frog, *Rana tigrina.*
6 Large stones.
12 Small stones.

The weight of this latter specimen was about 440 lbs. and it was with some difficulty taken out of the water while still alive by means of bill-hooks, bamboos, etc. After it was safely landed, the natives engaged in the process fell to discussing crocodiles in general; they alleged that these reptiles swallowed one stone every year and thus the age of a specimen could be ascertained by the number of stones found in its stomach. They also believed that after the creature has reached maturity the tail gets shorter year after year by the casting off of one of the vertical blades at the distal end of the tail. They said that there used to be a very old individual in an adjoining stream which had only two vertical blades left. It was venerated by the villagers near its haunts because it had never attacked a human being. It was subsequently killed by a Gond with his bow and arrow. It is worthy to remark that a large number of muggers one sees have their tails docked. Young specimens with complete tails have about 19 upright blades while some large adult ones have only 8 or 10.

They said that the villagers in the vicinity would be greatly pleased to hear of the destruction of this crocodile as the larger specimens were in the habit of drawing their cattle into the water while they went to drink. A crocodile, they also remarked was not one to let go its grip once it got hold of anything and while this specimen was being drawn ashore they warned each other to keep at a respectable distance from its mouth. This nuddy they alleged was full of muggers and through fear of them, fishing in it was out of the question.

E. A. D'ABREU, F.Z.S.

Camp, Bilaspur District, C. P.,
21*st January* 1915.

No. XVI.—THE THORNY TAILED LIZARD.

Those who reside in the arid and sandy plains of the Punjab must have observed and become familiar with the lizard depicted in the photograph, which is that of *Uromastix hardwickei.*

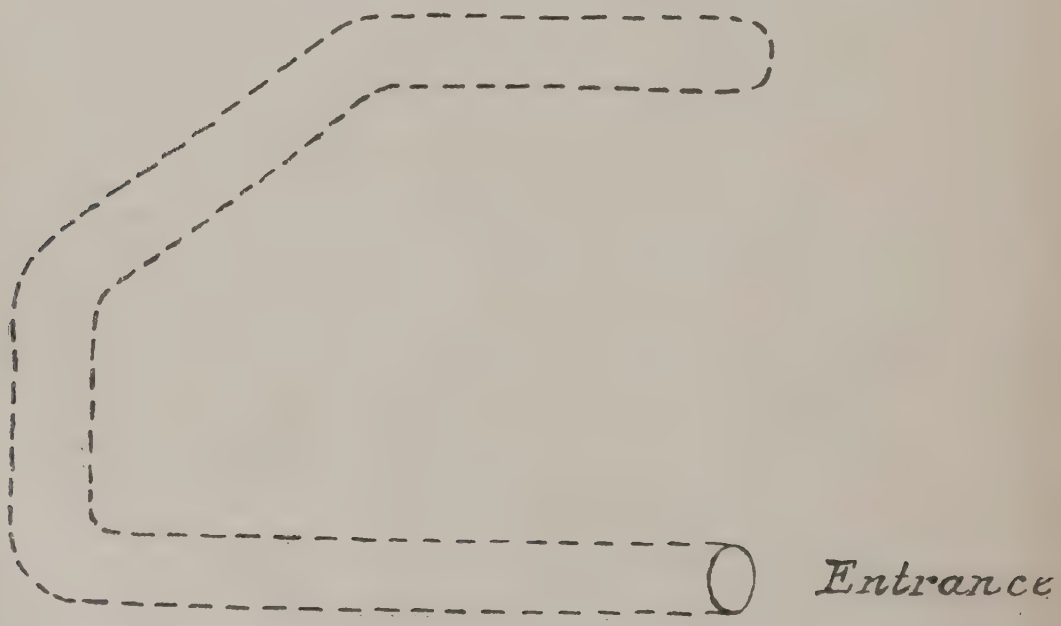
There are seven species of this lizard, which are found inhabiting Northern Africa and South Western Asia and unlike other lizards are clearly distinguished by the fact that the front teeth, instead of being small and conical, are in the adult large and united into one or two broad cutting teeth, separated from the cheek series by a gap. They are externally easily recognised by the absence of any crest along the back, or of folds or pouches in the neck, and by their short tails covered with well defined rings of spiny scales. Their heads are short and round, the body depressed, and the apertures of the ears exposed.

As each Doab of the Punjab rivers is taken up for irrigation and comes under cultivation, this lizard is found to disappear, and the following notes of personal enquiry and observation may be of interest to those who are familiar with this Agamoid.

The Punjab species (*Uromastix hardwickei*, called in Punjabi "Sanah," Hindi "Sanda") is found in the dry and rainless tracts of Baluchistan and Upper India. The rings of the spiny scales on the upper surface of the tail are separated from one another by rows of smaller smooth scales and are not in juxtaposition as found on the tail of the Arabian species. The lateral spines are largest, while those on the upper surface are small. This, as will be seen, is necessary in order that it may defend itself from the attacks of snakes. The small scales on the body are uniform and smooth. The colour appears to conform to the locality in which it is found; in many specimens examined on the Lower Bari Doab Canal, Montgomery District, Punjab, the back was generally covered with a network of black marks on a ground of yellowish coloured skin. Some were light and sandy in colour, others darker and slightly green. But all were marked with a typical spot on the front surface of the thigh. They are generally slow in their movements, but when frightened and making for their holes can get along fairly fast. In size, out of 21 specimens caught within one hour, none were over 15 inches, while the Arabian species grows to 18 inches and over. In the plains of the Punjab these lizards are generally found in slightly elevated spots where they would not be liable to be inundated by rainfall, and large numbers are to be found in certain localities that are suitable to them for food. There are a certain class of low class Indians who eat this lizard and hunt it systematically. These people can distinguish between the male and female by the length, shape and size of the tail, and in no case were they found to err. One specimen said to be a female being opened out was found to contain 15 eggs in it. They appear

to be absolutely harmless and are not known to attack or bite people when captured. They live entirely on vegetable matter, and are supposed not to drink water. During the spring and monsoon seasons, at the time when they are most active, they live on grass, and feast on the flowers and fruits of the Karir tree (*Capparis aphylla*), on the bean of the Jand tree (*Prosopis spicigera*) and the pelu or fruit of the Wan tree (*Salvadora persica*) all indigenous trees of the Punjab.

Just before the winter season sets in, and generally by the end of the monsoon season, they have grown very fat, and acquire two long strips of fat, which are to be found inside, along the whole length of the body on both sides along the back bone. This fat apparently supports them during about four months of extreme winter weather when they hibernate. On their reappearance in the early spring they are very lean, there is little or no fat left, and they are not hunted much till after the laying of eggs they have fattened somewhat. They live in holes singly, which they excavate for themselves. They appear in spring to meet, pair and separate. The females are said to lay white eggs in their burrows, about the size of that of a dove, but perfectly round. Several holes examined had their orifices almost parabolic in shape. The major diameter being about $2\frac{1}{2}$ inches and the minor $1\frac{1}{4}$ inches. One or two of their tunnels when excavated showed that they go down $4\frac{1}{2}$ to 5 feet below the surface and zig zag at right angles and backwards making it difficult for an enemy to attack them. One hole from which a lizard was extracted was as shown below in plan.



The end was 4½ feet below the surface and the length of tunnel was 9 feet and the slope averaged 2 to 1.

The Indians (sweeper caste) who hunt these lizards for food say that the meat is excellent and sweet like chicken, and this must be so as they are purely vegetarians.

Indians either dig it out of its hole, or if water is obtainable they pour it in till the lizard is forced through suffocation to come out. These two methods are troublesome and laborious and the more scientific operations related below are resorted to by these Indians who have observed and hunted the lizard for centuries. Generally after having had his feed, the lizard gets into his hole and lies just inside near the surface. In the forenoon the mouth of the hole is open while he is basking in the sun and in the afternoon and evening he lies near the mouth, covered lightly with earth thrown up with his front feet. The hunter if we may so call him, while approaching does not even allow his shadow to fall on the lizard, but advances stealthily, without shoes, lest the slightest noise should be conveyed through the medium of the earth, which is a good conductor of sound. For if such occurs, the lizard will disappear at once to the bottom of his hole. He holds in both hands the handle of a mallet and when he has reached the correct striking distance suitable to his length of arm and mallet, he strikes so precisely and with such practised and assured aim that he smashes in the tunnel just behind the lizard burying it in pulverized earth.

Having made it impossible for the lizard to turn and retire backwards into its hole, he feels about in the earth and seizing it with his hand draws it forth.

To keep it alive till it is required to be eaten, the spine near the junction of the tail with the body is dislocated. When it is necessary to kill the lizard the method adopted is to place the thumb nail at the junction of the neck and spine bone, and by pressing back the head cause it to snap, which causes instantaneous death.

The mallet, called by the Punjabi Indians "Dharemna," is generally 15 inches long with its upper diameter 5 inches and lower one 3 inches.

The length of the handle has however to be regulated to suit the height of each operator, and this is fixed in each case by making the length, including mallet, from the ground to the waist of the person for whose use it is meant.

Man is not the only enemy of this harmless creature, for snakes are also found to be very fond of attacking it. When a lizard hears the rustle of a snake it turns round and keeps 3 or 4 inches of its tail outside of the mouth of its hole. Stiffening its tail, it shakes it violently in a lateral direction. The snake attacks but is hurt by the side spines of the tail, which are hard and thorny and rip its mouth. After one or two futile attempts the snake, thinking discretion to be the better part of valour, retires defeated from the conflict. If the snake once gets into the hole before the lizard can get his tail outside he can swallow him with ease, because when once seized inside by the head the lizard can do nothing to help himself. The Indians having observed the method of defence adopted by the lizard have turned their knowledge to good account. In the rainy season when snakes are plentiful they take a small broom made of twigs and, coming gently near the hole of the lizard they make a rustling noise on the ground. The lizard mistaking it for that of a snake turns and protrudes his tail, which is at once seized. It can not, however, be pulled out in this way as it holds on with great strength and tenaciousness. A lizard is known to have had its tail pulled off and yet not let go. The Indian, however, does not use force. Having a firm grip of the

tail he introduces a stake sharpened at one end in the form of a crowbar, and levers the lizard out by pressure from beneath.

After killing the lizard as related before, in order that he may clear the internals, the Indian tears open the body on the underside, near one of its armpits, making an opening large enough to allow him to extract the stomach, liver, heart, and entrails, &c. This done, they place them with their backs downward one above the other in a vessel, and pouring in enough water to cover them properly, they boil them well, and then clean the scales and spines off, but do not take off the skin. It is then cut into pieces including the tail, but the four paws and head are rejected. The tail is considered a delicacy. The pieces are then washed and cooked with some clarified butter (ghi) and curry massalas along with any fat that the lizard may have had in it. After this has cooked for sometime, and when nearing completion, some milk made from flour and water is poured in into the vessel and the whole cooked till the grease separates. The wheat flour milk makes a rich gravy in combination with the fat of the lizard.

The fat found in the body of the lizard is also taken out, and boiled down in a vessel over a fire. The liquid obtained thus is of a bright yellow colour, and does not freeze in an Indian winter. It is used medicinally and fetches a high price with Indian Hakeems who use it as a cure for impotence. It is administrated by rubbing on the stomach, spine and thighs or eaten with bread and sugar. It is said to taste nice. On account of its heating properties it is reported to be very effective in Rheumatism, Gout and other similar pains and aches.

As an instance of the antiquity of the practice of lizard eating, it may be noted that Firdousi mentions it in his Shahnama over 900 years ago. He says:—"The Arabs by drinking the milk of she-camel and eating lizards have made such progress that they now aspire to the throne of Persia."

E. HOME PURVES.

MONTGOMERY, *5th December* 1914.

[We are indebted to Mr. V T. Janson for the excellent photograph of this lizard reproduced in the above note. The lizards were sent down alive by Mr. Home Purves and have been living in the Museum for some months. They are extraordinarily tame and placid and permit themselves to be handled without any objection or attempting to bite. If placed on their backs they will lie sometimes for some minutes with their legs in the air without endeavouring to move.—EDS.]

No. XVII.—NOTES ON SOME SNAKES FROM SIAM.

I have recently sent specimens of the following snakes to the Society's Museum, and the accompanying notes upon them may be interesting.

Trirhinopolis nuchalis.—The only previous record of this snake is, I believe, one specimen in the British Museum, from Toungyi, Southern Shan States. There are also two specimens in the B. N. H. S. Museum from Mansi, U. Burma. They were identified by Lt.-Col. Wall but have not, as far as I know, been recorded.

I have recently procured two more specimens. They were caught in the province of Ratchaburi, some two miles east of the Tenasserim border, in tall evergreen jungle, at an attitude of 770 metres. In lepidosis they agree in every way with Mr. Boulenger's description. (*Cat. of Snakes. Vol. I, page 419.*)

The details of my two are as follows.—No. 1. (sex undetermined, owing to damage). Total length, 458 mm. tail 53. Costals 15 throughout, the median scales faintly keeled on the posterior part of the body. Ventrals 141. Subcaudals 24.

Colour (in spirits). Above light purplish-brown, most of the scales edged with black so arranged across the back as to present a series of fairly well-defined circular or oval rings. Below whitish, freely speckled with black, and with large, black, rectangular spots, placed laterally. A black arrow-headed mark upon the nape, beginning at the frontal shield, and a pale chevron behind it. Most of the head scales edged with black. Chin and throat white.

No. 2. ♂. Total length 458 mm, tail 47. Dorsal keels more strongly marked than in No. 1. Ventrals 132. Subcaudals 24.

Colour. Light pinkish-brown above, the black edging to the scales forming posteriorly fairly welldefined cross-bars. Belly only sparely sprinkled with black. The rectangular spots become crescentic in shape in the posterior half.

Dendralaphis subocularis.—Previously recorded from Bhamo, in Upper Burma (the types), and from Eastern Siam, one specimen, collected by the Pavie Mission to Indo-China. I have had 4 more specimens from widely separated parts of this country, namely, Den Chai (near Phrae), Sriracha Koh Lam (a small island near), and Bangtaphan. Only the first named locality is of any altitude, the other three places being on the sea.

The total length of my largest was 600 mm. the tail forming 170 mm. Costals 15-15-11 (counted by Lt.-Col. Wall's method). Ventrals 168-158-165-165. Subcaudals 76-95-90-94. Temporals 2+2 ; supralabials, 8 in two specimens, the 5th entering the eye, 7 in the other two specimens, the 4th entering the eye.

Colour (in life). Above, bronze-brown, becoming greenish-brown upon the tail, the colour ending abruptly $1\frac{1}{2}$ costal scales above the ventrals. Belly pearly-white; beneath the tail, pale metallic citrine. A dark band passes along the outer margin of the belly, occupying the lower half of the last row of costal scales and the adjacent part of the ventrals. It is almost jet black in one specimen, very indistinct in the other three. Another black band passes through the eye on to the neck where it breaks up into short cross-bars and disappears. Lips white. Interstitial skin anteriorly pale blue. In three of the specimens, the vertebral scales upon the neck are yellow.

Dryophis prasinus var. *flavescens.*—Mr Bowden Kloss of the Federated States Museums informs me that he took the first specimen of this colour variety at Trang, in the Siamese portion of the Malay Peninsular. I have recently procured two more from localities near Bangkok.

The first specimen, an adult, was of a bright chrome yellow above (still brighter, I am informed in life) in the anterior two-thirds of its body, turning to a pale fawn posteriorly. Below yellowish-white. No flank line. Chin pure white. The interstitial skin was alternately black and white, as is usual with this species.

The second specimen, a half grown one, which I kept alive for some time, had the yellow colouring faintly tinged with green in the fore part of the body and with brown in the hinder part. Belly pale yellow anteriorily, yellowish brown posteriorly. Tongue and iris yellow. A minute black dot at the margin of each ventral shield in the anterior two-thirds of the body. Interstitial skin, alternately black and yellow, except across the vertebral region, where the yellow became white.

Another specimen of this snake, caught in the same locality as No. 2, was of a dirty cream colour throughout, with tongue and iris to match. The interstitial skin however retained its usual black and white pattern, and this fact, I think, would entitle it to rank as a colour variety, and not as a case of albinisim.

I may add that from the localities where the above specimens were caught, both the green and the grey forms of this snake are to be found.

Callophis maculiceps.—A new colour variety. This snake although not common in Siam, appears to be widely distributed about the country. Of the 9 specimens which I have examined two have been so distinct in their markings that they are entitled to rank as a new colour variety, which is as follows:—Above, light yellowish-brown, without the usual series of small dorsal dots, but with a conspicuous black vertebral line running the whole length of the body and tail. The usual tail bands are present. Head and neck black, with a pale yellowish line along each upper lip, interrupted below the eye. Belly coral pink. Tail below, more or less thickly spotted with black.

This variety is similar to the var. *univirgatus* of *Callophis maclellandi*, and the same title would be suitable for it.

Of the remaining seven specimens, six have the usual series of small black dots down the back and do not differ from the recognized description, except that they have in addition a very faint, dark, vertebral line.

The other one is intermediate between the two forms, and has both the dots and the vertebral line well marked.

Mr. Boulenger in the *Catalogue of Snakes in the British Museum* and in the *Fauna of the Malay Peninsula*, gives the number of ventral shields in this species as varying from 205-247. None of my specimens showed so many. They ranged from 173-198.

Lt.-Col. Wall in his supplementary characters of idenfitication (*Poison. Terr. Sn. Brit. Ind.*) says: Anterior sublinguals touch 4 infralabials. This only occurred in one of my specimens and on one side in another. In all the others 5 were in contact.

Hydrophis klossi.—Previously known from a single specimen taken at the mouth of the Selangor River, Federated Malay States. During the last fifteen months, I have received 7 more specimens, six of them from the mouth of the Tacheen River, at the top of the Gulf of Siam, and one from the river Menam, above Bangkok. The latter was found no less than 50 kilometres from the sea, and almost beyond the limit of brackish water. It was caught in the month of May, when the river would be at its lowest level, and the salt water therefore extending furthest inland.

My specimens did not entirely agree with the type description (*Fauna of the Malay Peninsula, Reptilia and Batrachia, p.* 190) and Mr. Boulenger, in reply to those which I sent to the British Museum, wrote "I have compared your *Hydrophis* with the type of *H. klossi*, and although there are differences, I think they must be referred to the same species."

Details of my seven are as follows:—Total length of the longest, a ♂, 1090 mm., tail 115. The greatest thickness of the body is in its third quarter. Rostral shield variable as regards height and breadth, portion visible above equal to $\frac{1}{2}$ to $\frac{2}{3}$ the internasal suture. Frontal as long as broad or longer than broad, never as small as in the type specimen, not as

small as the supraoculars. One præ—and one postocular. A single large anterior temporal. Supralabials 5 (in one a small 6th might be counted by some), 3rd and 4th entering the eye, 2nd largest and in contact with the præfrontal. Sublinguals, posterior pair present in six specimens, absent in one, when present separated by a scale. Marginals present on one side in one specimen, after the 3rd and 4th infralabials. Costals anteriorly 23-27, at the greatest diameter of the body 33-38, imbricate, smooth or keeled anteriorly, with a short or complete keel posteriorly. Ventrals small but distinct, less than half the breadth of two adjacent costals, seldom divided up, 361-395.

Colour (in life). Pale grey above, merging into yellowish below, and with dark grey annuli, as broad above as below in the fore-part of the body, twice as broad above as below in the hinder part.

Two of my specimens caught in December and January respectively contained 2 eggs each, without any trace of embroyo.

Enhydris hardwickii.—In the last number of the Journal there is an article upon the Sea-snakes in the Society's Museum. No mention is made of *Enhydris hardwickii*, and I presume, therefore, that the Museum has no specimens. I send four, two ♂ and two ♀.

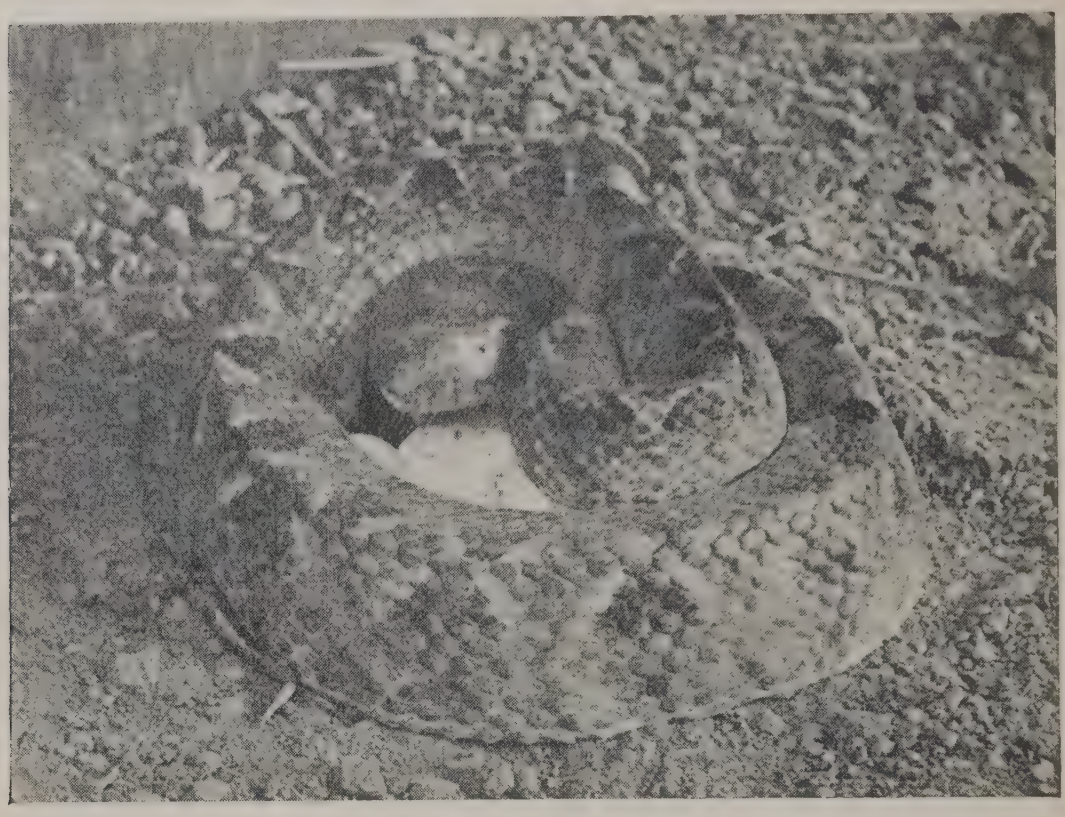
This species is exceedingly common at the head of the Gulf of Siam, infinitely more common than *Enhydrina valakadien*, judging by the number of specimens I receive. They are caught in the nets at the fishing stakes some two miles from the mouth of the Tacheen river, and during the fishing season, which extends from October to March, I can rely upon getting 20 or 30 specimens any day I care to ask for them. They are sent up to me alive and will live for a time in fresh water, but their ceaseless efforts to escape tire them out and in about two weeks they die.

The difference in the sexes in this species is well marked, the males being characterized by the stronger keels upon the scales of the back and sides and by the pronounced tubercles upon the belly. In some old males these latter are very well marked and become veritable spines of considerable length. Another point of difference which so far seems to have escaped observation is the number of scales round the body, which is less in the ♂ than in the ♀. In the former it varies from 23-27 in the anterior part of the body to 26-31 in mid-body, in the latter 29-36 in the anterior part of the body to 33-42 in mid-body. The ventrals are very small and frequently absent altogether so that it is difficult to form a true count. There are, however, less in the ♂ than in the ♀.

Ancistrodon rhodostoma.—This viper has been recently shown to be widely distributed throughout Siam, and in certain places to be fairly common. It has been found as far North as Muang Fang, near the Southern Shan States, and may therefore ultimately be found to enter into the fauna of Burma.

Of the Asian Crotalinæ, only one, I believe, namely *Lachesis monticola* is so far known to be oviparous (*vide* Journal of this Society, Vol XV., p. 729). The accompanying photograph, therefore, is interesting, as showing that *Ancistrodon rhodostoma* has also this habit.

The event took place in captivity, but the period of incubation is unknown. The mother had been caught ten months before, and had shared her cage with two others for nine months. It is therefore probable although intercourse was never witnessed that it took place in captivity, although I should state also, that as her two companions are still alive, their sex is not yet definitely known.



The eggs 13 in number, were deposited on the night of September 1st, and the mother was found in the morning to have assumed guard over them in the attitude shown in the photograph, nor did she, as far as I am aware, ever leave them to take anything during the whole period of incubation. I have never seen these snakes drink anything, so that the want of water would be no great privation on her part. In her own sluggish way, she strongly resented any interference with her progeny, and for fear of causing her to desert her eggs, and so bring this interesting occurrence to a premature end, I did not attempt to examine them in detail.

On October 11th, she was dislodged from her post by a falling branch, and did not attempt to regain it, but lay beside her eggs. On the following day she left them entirely to eat a mouse and the same night cast her skin, returning afterwards to her original spot. Whether or no this was in order to continue her guard, I cannot say, as these snakes have the habit of selecting a corner in their cage, to which they usually return time after time, unless disturbed in any way. Six days later, that is 47 days after deposition of the eggs, the first young one appeared and four more followed within 48 hours. Of the remainder, three were shrivelled and dead, and the others did not seem to have sufficient strength to break their envelope. The mother took no notice of them. The young as soon as they emerged were extremely lively, "rattling" their tails with great vigour, and striking out viciously if interfered with. In length they varied from 148-162 mm., and in colouration did not differ in any way from the adults. I could find no trace of a fœtal tooth.

The eggs had the usual soft, white, parchment-like covering and were bound very firmly to each other by some glutinous substance. Those I measured were about 22 mm. broad by 30 long.

One other record of the breeding habits of this viper was told me by a European working in a locality where they are fairly common. He killed a

large one in the month of July and about "30 eggs came out when he cut her open." This is no doubt an overestimate of the number, but the head which he sent me in confirmation of his story is considerably larger than the head of my female which laid 13 eggs.*

With regard to the poison of this snake, it is not considered by the country people, in those localities where it is well known, as being fatal to human life, and the observations and experiments which I have been making during the past year with specimens in captivity fully bear out this statement.

MALCOLM SMITH, M.R.C.S., L.R.C.P.

BANGKOK, *January* 1*st*, 1915.

No. XVIII.—BULL FROG AND RAT-SNAKE.

A large bull-frog (*Rana tigrina*) captured in the act of swallowing a young rat-snake (*Zaocys mucosus*) has recently been presented to the Madras Museum from Kayenkulam in Travancore. The frog has succeeded in swallowing nearly three-quarters of the snake which has a total length of 34½ inches. There appears to be no reason to doubt the statement of the donor who captured the two animals in the exact condition in which they now exist.

B. SUNDARA RAJ,
Zoological Assistant, Madras Museum.

MADRAS, *January* 1915.

No. XIX.—"FISHING WITHOUT A FISH HOOK."

Several of the small mountain torrents and large rivers in Sikkim are full of fish at certain seasons of the year, generally in March, April, May, September and October; and during these months, specially during March, April and May, and late in February, when the water is clear, one often sees the young Paharia and the Lepcha, too, catching fish and getting a fair bag in a very primitive way; no hook is used, only horse hair slip knots or nooses one on either side of the bait which always consists of a couple of grubs tied star wise in the centre. These grubs or worms are got from underneath the bark of the silk cotton tree, the "Simal", and are evidently the young of some borer who is partial to the *Bombax*. These soft grubs have black heads, and yellow and white bodies; and when adroitly tied form a very attractive looking bait ravenously eaten by a certain class of fish, the Snow Carp for instance, also a large fish weighing sometimes up to 8 lbs. called in Paharia "Asla". The Carp is generally got in small mountain torrents, and the "Asla" in bigger rivers, like the Teesta in Sikkim and the Amachu in Bhutan, or Torsa in the Dooars. Last year while camping on the Amachu in Bhutan, in February, I saw two Paharias, fishing with jointed bamboo rods, cotton lines, and horse hair nooses; the rods had three joints, the lines were ordinary sowing cotton four ply neatly twisted and fairly strong. At the end of the line was a foot of horse hair with two circular nooses, the bait being in the centre of the two. Six inches below the bait were several strands of horse hair, all the hair being white, and to one strand was fastened a small smooth pebble picked up in the stream. While casting the line, this pebble often came off as it was not a permanent

* This female has since died. She measured exactly 800 mm. in total length.

fixture, nor intended as such. It was merely a weight to help in casting the line, also to cause the bait to sink to the bottom of the stream, or nearly to the bottom. It was only fastened by one single hair, as the fisherman explained that if it was a permanent fixture it would catch against the rocks and boulders at the bottom of the torrents and streams, which flow very fast indeed, and break his line or else would aid a fish by adding extra unnecessary weight to his frail line. Once a fish is in one of the nooses, and starts struggling and fighting, the pebble breaks or slips away, being only temporarily held by a single hair. It has done its work in sinking the bait and taking it along the bed, it is not required once a fish is firmly held. Even if it sticks between two boulders, when there is no fish caught, a slight jerk soon frees the line and the pebble remains, for the hair fastened to it breaks, as was intended. Experience has therefore taught them that a permanent lead is not required and rightly so. The length of line used was about 50 feet, the one I send you is that length. No reel is used, but the line is wound round a flat $6'' \times 3''$ board having an opening along one side, through which the left hand fingers are passed. The Paharia is very dexterous in his use of this primitive piece of board, it is as you will observe shaped to a cutting edge, so that the line slips off it easily when he is playing a fish. When he wishes to haul in the line he simply pulls it in, in long loops and works it back again on to the flat piece of board very cleverly. In casting he does not cast in the usual sense of the word, but swings his line backwards a bit, by a sidelong pendulum-like movement throws it out, the pebble at the end of the line helping him very considerably, and once the line is out on the swing, he lets out a lot of it, and is able thus to drop his bait at any place he wants to, and a good distance out too. The long rod generally used also helps him to throw well out in a stream if necessary. He always casts in a rapid or fast flowing water not very deep, and not in a pool, or deep fairly still water. I saw several fish caught, and caught some myself but could not play them so well as the Paharia did, not being used to the tackle. He got one over 4 lbs. in weight and it was a little devil, showing great fight. It went down stream as hard as it could go and the Paharia went with it jumping from boulder to boulder with astonishing dexterity; keeping his rod perfectly horizontal for the first few minutes, then he played it very successfully and landed it about 2,000 feet below the place he caught it, as I measured the distance with my tape. The time taken was about 20 minutes, for, as he explained, he had to tire out the fish properly, as he could not take any liberty with his frail line. This 4 lbs. fish was held just below the gills by the noose on the right hand side; the noose on the left was not out of shape at all, being perfectly circular and complete. Fish are held in various ways, some round the neck, some by the tail, some by the snout, and some even by one fin only. I have seen them held by all these parts. One Paharia assured me he had got two fish at the same time once, Snow Carp, and I can imagine this quite possible for in one or two streams you cannot pull them out quick enough with an ordinary fish hook, using "atta," or worm bait, they are so ravenously hungry and numerous. The bait once put on properly in the centre of the nooses is used over and over again, in fact for a whole day's fishing, as no fish can ever swallow or eat it up, it is so well fixed and they never get properly at it. Many fish slip away from the nooses even after they have been played for some time and this is but natural, as they are so slippery and wriggle themselves free; but not many escape that are held round the neck; on an average about one in three get away and slip through. This you can always tell as the size of the noose that held it comes out of the water much smaller than the others. The

marvellous thing about these nooses is that even in a roaring torrent they never lose their circular shape, or become ineffective through the action of water on them while immersed ; one seldom has to readjust them.

The recurring trouble or bother is in replacing the small round smooth pebble which so often gets detached, and lost, sometimes in the water and sometimes while casting. The rod and tackle I brought in from Bhutan were shown by me to a Captain and Mrs. York, of Hutton Hall, Marston, at the Woodlands Hotel, Darjeeling. He was travelling sight-seeing in India and was a great fisherman and his evident keen interest in the primitive equipment for fishing without a hook was so great, that I made a present to him of the tackle, but the rod is with me.

C. H. DRACOTT, C. E.,

State Engineer, Sikkim.

GANGTOK, 6*th March* 1915.

No. XX.—THE BUTTERFLY *ARGYNNIS CASTETSI* IN TRAVANCORE.

With reference to note No. XXI on page 587 of Volume XXIII, No. 3 on *Argynnis castetsi*, it is a mistake to restrict the occurrence of this butterfly to the Palni Hills in S. India as it is just as common on the Kannan Devan Hills, commonly known as the High Range of Travancore.

The Palnis run East to West from near Dindigal to the Travancore frontier at Pambardi Shola. They are divided by the Neutral Saddle into the Lower and Upper Palnis. The Lower Palnis are East and the Upper Palnis, West of the Saddle. *A. castetsi* has been reported from the Upper Palnis, but it would be interesting to learn the dividing line on the East, where it ceases to occur. There is no reason why it should not be found on Perumal Mallay which is on the Lower Palni side of the Neutral Saddle. The Western Ghauts run from near Cape Comorin in the south without a break to the Palghaut gap on the North. At the Pambardi Shola frontier of Travancore the Palnis join the Western Ghauts at that part of the latter called the High Range. On the Palnis the rainfall is less and the plateau country less rugged than on the High Range of Travancore, and the change is quite definite and apparent at Pambardi Shola. The Travancore valleys are deeper and the summits of hills and the elevated plateaus higher than on the Palnis and there is more forest.

The rainfall increases the further west one goes from the Palnis. The heaviest rainfall on the latter occurs in the N.-E. Monsoon during the months of October, November and December, while on the High Range the period of heaviest rainfall is in the S.-W. Monsoon in June, July and August.

I have taken *Argynnis castetsi* on the Kannan Devan Hills at 4,500 feet, where the rainfall is about 300 inches per annum, and frequently exceeds that amount in certain years. I have seen it also on Aneimudi mountain 8,837 feet altitude. In this vicinity the hills become the British Annamallays and there is no reason why this butterfly should not extend over them as the character of the country remains the same for some miles. It alters further west in Coimbatore District into practically unbroken forests of very large timber. That country is being opened up into Coffee, Tea and Rubber Estates, which will probably mean the introduction of the food plant of the caterpillar from the surrounding hills, and with this the butterfly is likely to follow. The Palghaut gap between the Annamallays and the

Nilgiris is not so wide as to make it impossible for the winged insect to cross, so that it is curious if it does not occur on the Nilgiris, the climate of which approximates to that of the Palnis.

If the butterfly is not found on the Annamallays, it would be another interesting point to ascertain the exact point where it ceases to exist in that region, and the cause, which is not apparent to one who like myself knows the country well, though I have not had the opportunity of chasing butterflies further than the Kannan Devan Hills.

I see Bingham (*Fauna of British India* Series) mentions a Nilgiri form, and " ♀ Typical as described from Trichinopoly," this cannot mean that the insect occurs at Trichinopoly, which is the headquarters of Father Castets, S. J., (after whom the butterfly was named), who works in St. Joseph's College in that town.

AYLMER Ff. MARTIN.

BANGALORE, *March* 1915.

No. XXI.—THE "MOON-MOTH" AS A PEST.

This beautiful wild silk moth—"*Actias selene*, Hub." popularly known as the moon-moth—is one of those insects not commonly met with in numbers. It might, therefore, be interesting to note that recently at the Agricultural College, Coimbatore, this insect has been so numerous as to become a pest. A number of trees, *Odina wodiar*, four to five years old, growing in front of the College were literally denuded of almost every leaf by *Actias* larvæ. Photographs show one tree completely defoliated with a few cocoons attached to the bare branches and another partially damaged. A few of these stout and gaudily coloured caterpillars first appeared on some of these trees in October last and I did not then suspect that this rare insect would again appear in such numbers as it did later. The second brood of caterpillars was observed on these trees in December and very recently by about the middle of February the third set of caterpillars appeared. This last brood of worms was sufficiently numerous to do a considerable amount of damage to the young *Odina* trees. Many of these are bare and completely leafless while a few others have been almost skeletonised. On the soil around some of the badly attacked trees was seen a thick layer of excrement pellets almost resembling sheep's dung. The large flimsy and dirty yellow silken cocoons are found attached in numbers to the lower portions of the stems of the trees close to the soil though a few are found attached to branches and enclosed by a few leaves. A detailed account of the life history of this insect as studied at Mussoorie is given by Hutton (see—Cotes' account of the Wild Silk Moths of India—Indian Museum Notes, Vol. II, No. 2-1891); but it may be noted here that the time occupied by each stage in the life history of the creature differs in this locality as compared with that at Mussoorie. This is naturally due to the climatic variations between a place along the Himalayas like Mussoorie and one in the plains of South India. This insect has been noted to feed on various plants such as *Xanthoxylum acanthopodium*, *Cedrela paniculata*, *Corearea nepalensis*, etc., etc. I have found it once or twice before on the Moringa tree (*Moringa pterygosperma*) in Saidapet, Madras, but only one or two caterpillars at a time and these moths were till now preserved as rare specimens for the collection. Thwaites has noted it feeding on *Odina wodiar* (see Moore's Lepidoptera of Ceylon). It will be interesting to learn if any of the readers of this Journal have noted this insect on any of these plants in such numbers at any time.

This is evidently one of those insects which occasionally depart from their normal course of life and assume the more important role of pests when the circumstances happen to be favourable. What the circumstances were in this case it is not possible to assert with any accuracy. *Odina wodier'* is, of course, not a plant of any great economic importance but we would certainly be surprised if one day the insect appears in numbers on an useful plant like 'Moringa' which happens to be one of the insect's alternative food plants. In conclusion, it need hardly be stated that examples like this often give us warnings of what possibilities there are among insects and make us keep an eye also on all general insects instead of confining our attentions solely to the known depredators of the insect world.

T. V. RAMAKRISHNA AIYAR, B.A.,F.E.S.,F.Z.S.,
First Assistant to the Govt. Entomologist, Madras.

THE AGRICULTURAL COLLEGE,
COIMBATORE, 9*th March* 1915.

[We have been unable to publish the photographs.—EDS.]

No. XXII.—THE SWEET ARECA NUT, *ARECA CATECHU* VAR *DELICIOSA.*

PRELIMINARY NOTE.

The authors in describing the species *Areca catechu* L. in the *Flora of British India*, Vol. V, page 406, do not mention the astringent taste of the seed. The ordinary betel nut has a very astringent taste when tasted raw (before boiling), the amount of tannin and glucosides being over 14 per cent. (Lewin. über *Areca catechu*, &c.). The present variety is fairly sweet to eat and is further distinguished by the fact that the emdosperm is much lighter in colour and softer. On account of the latter character, it becomes pulpy and does not lend itself to the treatment which the areca-nut undergoes before being sent to the market. The cultivators find it a loss to propagate these plants and it only grows occasionally in the areca gardens. The plant bears the same type of fruit year after year and has to be ranked as a distinct variety. I propose the name var. *deliciosa* on account of its pleasant taste.

Areca catechu L. var *deliciosa* : Tree 40 to 80 feet high with leaves and flowers similar to those of *Areca catechu*, fruit slightly smaller about 1 inch in diameter, remaining green even when nearly ripe, endosperm pale white in colour, soft when ripe, percentage of tannin much less.

Distribution: -Occasionally met with in the areca gardens in the Western Ghats of Mysore.

M. K. VENKATA RAU,
Sr. Asst. Mycologist.

BANGALORE, 8*th March* 1915.

No. XXIII.—NOTES ON CUTCH AMMONITES.

VI.—The Habye Hills.

In previous notes I have shown how the rocks which compose Cutch have roughly speaking been crinkled into three folds, with axes running East and West, in parallel lines. The first line (from the South) occurs 30 miles North of the Gulf of Cutch ; the second line, 16 miles North of the first ; the third

line 30 miles North of the second, forming the "islands" of Putchum, Kareer, &c., in the Runn. The first line I have sketched as it occurs at Ler, Fakirwadi, Bharasar and Sumatra. The second line has been illustrated by its exposure at Keera Hill, to which I now add the exposure in the Habye Hills. The third line must wait a bit.

SEQUENCE OF CUTCH AMMONITE BEDS.

The inset table shows the sequence of the Ammonite beds in Cutch. The "Sub-Anceps beds" are an addition of my own to the usually recognized list; for there seems to me to be a distinct type of rock coming up from below the Anceps in which I have found no Anceps fossils: yet it lies much above the Macrocephalus beds. A fossil much like Waagen's *Perisph, Perdagatus* seems its characteristic.

Oomia beds (NEOCOMIAN).

Ketrol beds (KIMERIDGE).

Dhosa Oolite (OXFORDIAN).

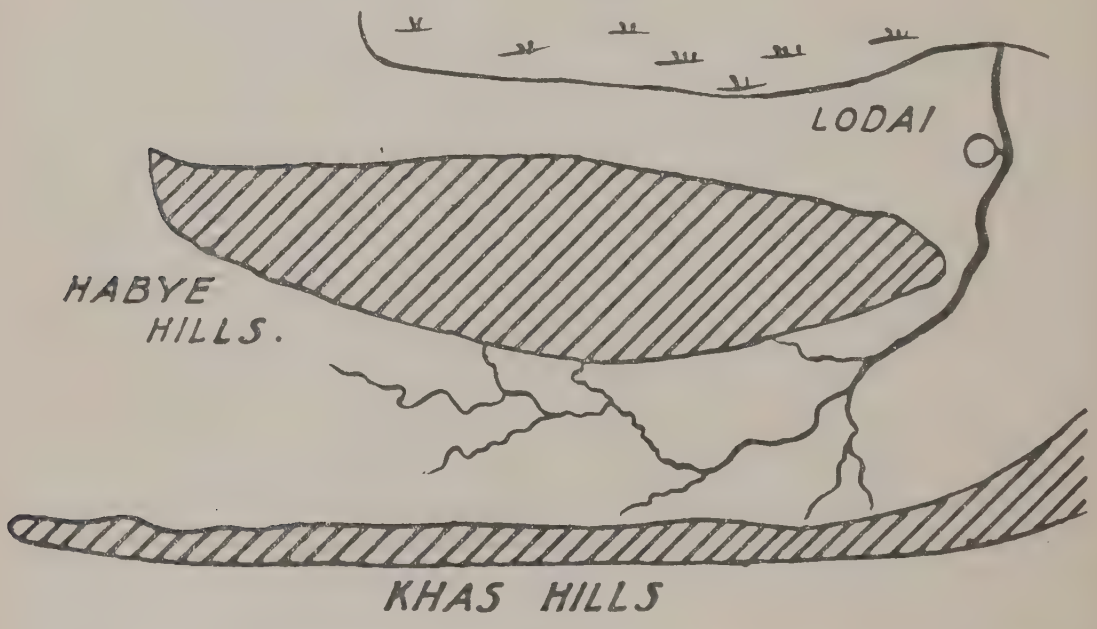
Athleta beds (CALLOVIAN).

Anceps beds (CALLOVIAN).

Sub-Anceps (CALLOVIAN).

Macrocephalus beds (CALLOVIAN).

Putchum beds (BATH).



North-East of Bhuj, some 12 to 15 miles away, rise the Habye Hills, a chain 9 miles long and two miles wide, tapering somewhat suddenly at both ends before diving down again below the level of the plain. Their highest points are about 800 feet high. To explore them the village of Habye, once the site of Cutch's capital, makes a good head-quarters. It lies on the south side of the hills, $2\frac{1}{2}$ miles from their east end. As you approach the hills from Bhuj, you cross the ridge of the Khas hills which consist of cold yellow and brown sandstone slabs, guiltless of Ammonites. They dip south and are scarped on the north front; probably at one time they extended further north and formed a sheet covering the whole of the Habye Hills. Climbing down the scarp, you find yourself in a flat valley some two miles wide stretching up to the base of the Habye

Hills. These latter come up in sheets of rock sloping up to the north-folding over at about $1\frac{1}{4}$ mile from the base, and slanting down at a steeper angle to the fields which fringe the Runn. The valley is drained by a largish stream with many tributaries from the hills on either side—which runs east and curves round the eastern end of the Habye Hills, proceeds N. to the village of Lodai and loses itself in the Runn. It is however only a monsoon river: by February only a few tricklets are moving.

Nature has been hard at work on the hills with her chisels of rain, wind, cold, &c. The whole mass is seamed and scarred with very deep nullahs which almost from their commencement on the summit have cut deep down into the surrounding beds of rocks, leaving ravines with the strata exposed in cliffs. The topmost ridge consisting of the earliest strata is scored and bent by these agents, it runs for a hundred yards or so and falls into a ravine to rise again further on.

The first thing to do is to decide your geological footing. This is not difficult. Riding along the cart-road along the south edge of the hills, you will probably notice an Ammonite fragment here and there lying among the yellow slabs. 'Hullo' you say: 'that's the duplicate of a Samatra '*Athleta*'.' Sure enough it is. It differs somewhat from Waagan's illustration, but it is more akin to that than to any other Peltoceras which he gives, and it is on the same level, for further search reveals other Athleta-bed species. *Harpoceras dynastes* is here: also the big flat plate-like fellow which is remarkably like Waagen's illustrations of *Aberrans* and of *Congener*. This species is a marked feature of the Athleta beds along Fakirwadi Ridge. A stroll along this same slope of rock later revealed two *Aspidoceras ponderosum* and also a new *Lytoceras*—of which more later.

Now along the Fakirwadi Ridge, at Ler, at Samatra, the Athleta beds are all soft—hollowed away by rains. Here the ridge is of hardstuff—tough yellow slabs with some layers of rounded stones like huge artichoke roots. Still it is all Athleta: on the tops of the ridge was a *Harp. dynastes* embedded in a slab. And the scarp on the other side of the ridge shows the thickness of the Athleta beds to be here about 70 feet. As you pass eastwards along the cartroad you will see a darker rock protruding in places on your right. Examine this: you will find it to be Dhosa Oolite with great round Stephanoceras (*transiens* and *polyphemus*, as far as I can judge) embedded. And further east still where the curve of the strata round to the N. begins, the slab rocks which here form the base of the hills are of D. O., studded with the water worn discs of *Asp. perarmatum*, *Steph. transiens*, *Nautilus*, &c., all old D. O. friends. An excellent specimen of *Per. rota* was also found. In a nalla a short way within D.O. rocks there lay a large flat pancake-like *Phylloceras* with apparently no furrows, but this may have come down from inner beds.

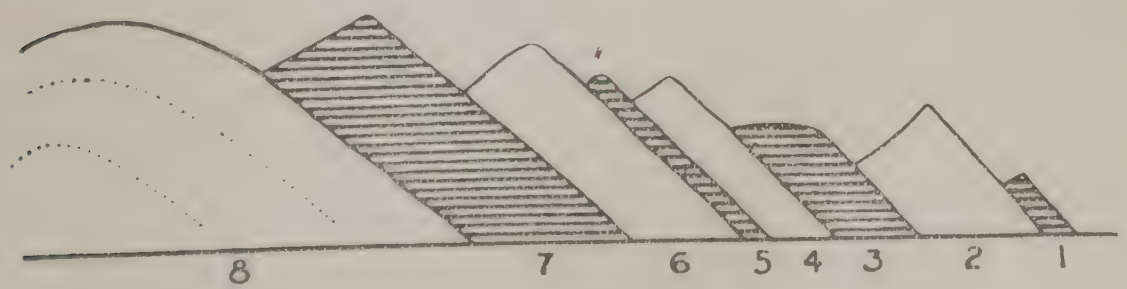


Fig. 2.

1=D. O.
2=Athle
3=Ancep
4=Sub-Anceps.
5=Grey mollusc belt.
Perdagatus (?) belt.
7=Grey barren rock.
8=Macrocephalus.

Having established the D. O. and the Athleta beds, one not unnaturally looks to see if the Katrol beds are at all in evidence. The place they should occupy is just outside the D. O. beds—but here it is all the wide sandy nulla, which would seem to have eroded all the outcrop of the katrol layers. Considering how tough and hard the katrol beds along Fakirwadi exhibit themselves, one would have thought the nulla would have left several ridges outstanding: but from Habye for some distance east and west there are no signs of katrol strata. However from near the village of Jihadi—two miles west—a man brought me several Ammonites of distinct katrol era: and I found katrol beds on the north east side of the hills near Lodai tank. Looking towards the range from this latter tank, you see a cluster of low flatly rounded knolls, coming down close to the tank. Examine their broken debris—and you will find katrol fossils. One is just like the common *Bathyplocus* in its earlier stages: and one is an *Oppelia* (?) with faint spiral furrow along the middle of the whorls—just such a one as I found in sandy nodules at Yala Khawas in the Fakirwadi katrols. Other fragments bear out the identity of the beds. One might guess that when the Habye hills were squeezed up into their anticline, these knolls were squeezed up as well. I had no time to examine the mass of them—but their facies seemed much the same all over. So we may now consider it proved that we have got exposed here the usual sequence—so far: *viz.*, Katrol, D. O., and Athletas.

To give a logbook of expeditions would be of little interest. I will confine myself chiefly to the easiest ascent which I struck. Ride along the cart road from camp eastwards till the road dips down into the big nulla of the Khaswali River—just where the melon patches are being cultivated. Here on your left there emerges, through a cutting in the D. O. and Athleta ridges, a small stream. Looking up through the gap, you see the ground rising in easy slopes up to the crest of the main central ridge about a mile away. Follow the nulla upwards.

Your first ridge is D. O.: the second, Athleta: the third is a long gradual slope of 300 yards. It is Anceps. Ammonites are rare—but the nulla shows great quantities of marbled crimson slabs—marbled with the white of shells. (There are too a great many slabs of a tough bluish-white stone crammed with molluscs but these come from a bed someway higher up.) One Ammonite fragment looks like *Per. gudjinsirensis* which 'grows' in Fakirwadi Anceps: there are plenty of belemnites, pectens and other molluscs. The dip of all these strata is, I should guess, about 15°. The "false conglomerate" which occurs under Anceps beds in the Ler Hamundra section also occurs here, coming up just where in my opinion the line between Anceps and Sub Anceps beds may be drawn. Then come hard dark-brown slabs of rock—full of mollusc life—rhynconella, pectens, etc., also an Ammonite of the *Perdagatus* type, found in the same beds in the Ler Hamundra Ellipse. Also a hollow-backed Nautilus—possibly *kumagunensis*. (I might here add that hollow-backed Nautili occurs also in Athleta beds and in D. O. Waagen's hollow-backed one was only from Macrocephalus strata.) Descend the Falus of the Sub Anceps scarp, and you will find the light bluish white slabs—of which many fragments have been carried down the nulla—lying in situ. They form a great sheet, coating the succeeding hill: I found only one Ammonite here—one of the *Perdagatus* type and from its beautiful preservation and clearness I longed to find more—but time forbade. Towards the summit of this knoll—whose lower part these slabs cover—the grey fades away into yellow brown rocks which rise into a ridge. Sitting down for a rest on its summit, one noted the protruding edge of an Ammonite—which when duly hammered out of its environment showed some affinity with the Ancep's family. The inner whorls had the large spine like

that of *Per. rehmanni* at the furcating of the ribs: but the outer whorl had lost all spines. Unfortunately the specimen was only partial, and much corroded. Some slabs on the top of the ridge were coated thickly with clusters of a diminutive blue white shell, straight, tubular, tapering. I found the same on the summit of a knoll in the Ler Hamundra Ellipse. I cannot find any sign of this species in Zittel's Palaeontology Text Book.

The sides of this knoll, which is the limit of the Sub Anceps beds, slope down to nullahs: and from underneath the knoll beds, there sweeps up the great grey mass of rock which proved so damping in the Ler Hamundra Ellipse. At this point the strata of these barren grey rocks does not seem to be so thick as they are three miles west. There they are of perhaps 200 feet thickness: here perhaps only 50 feet. The ever-handy nullah shows them in profile. They run sloping up at the same angle as the outlying strata, but as they come more east, they dip round in an easy curve so that they shut in the whole central core of the hills. This central core runs in a light yellow ridge, over topping the fallen-away husks of the barren grey sandstone. It is yellow with dried grass: its matter is dark crimson of which patches appear here and there.

Now this core is the exciting part of the whole thing: the main hope with which I started for these hills was that of finding golden oolite here. The books make no mention of the golden oolite of Keera existing here: but by the usual sequence of rocks, it should be here. The specimens described by Waagen as coming from this neighbourhood were only ten in number, 8 of which were from the D. O. The existence of a *Nautilus kumagunensis* seems to have puzzled him: and the finding of a *Steph. dimerum* (a *Macrocephalus* species) is located as "N. W. of Lodai"—which would be out in the Runn. If the previous explorers had negotiated the central core of those hills, the solution would have been found. The central ridge is of the Macrocephalus age. After much prowling over the small broken crimson cubes of the summit, an Ammonite—much like *Steph. diadematum* was discovered. Other specimens gradually followed—one and all repeating the form and features of the *Stephanoceras* of Keera Hill. To say that this or that specimen is a *Dimerum* or *Grantanum* is not allowed until one has more of the types available for comparison, but I have no hesitation in believing that these crimson beds were being deposited in the seabed at the same time that the golden oolite and shales of Keera were being laid down. The *Stephanoceras* which I have found resemble the following of Waagen's list:—*Diadematum*, *Chariense*, *Macrocephalum*, *Subtrapezium*, *Dimerum*, *Grantanum*, and also *Arenosum* (which latter Waagen places in D. O. beds).

Now I had no time to explore the north side of the ridge. From the summit, by the Jhakle temple, one could see a very deep nulla side running north, cutting deep down into the strata of the beds a very short distance north of the summit of the anticline. Such a nullah should (if the ground is not faulted) reveal the section of the beds to a good depth below this crimson Macrocephalus stratum. There are said to be deposits of black marble just about there: none of these beds so far examined on the south side of the anticline show any traces of marble. Nor have I explored the west end of the hills—beyond discovering once the rise of Katrol beds (dipping W) some way from the west end of the main mass of the hills. From a distance one can see that the main yellow ridge (yellow with grass) runs persistently to well nigh the west end of the mass. Hence these notes do not profess to give anything like a complete account of the hills. Yet as they may be of use to a scientist who may desire to thoroughly exploit the Cutch Ammonites, I send them as they stand.

The *Lytoceras* of the Athleta beds referred to above is only the fragment

of a large whorl with sutures to the end. There are no traces of cremulations. The striae-like ribs are numerous and close, rather more pronounced on the periphery and on the inner curve than on the sides. The Athleta beds also produced two *Echinolampas* fragments and several large bits of coral. The corals were in nullahs and may have been washed down from beds higher up the hills and therefore of earlier deposit.

J. H. SMITH.

Bhuj, *Feb. 25th,* 1915.

PROCEEDINGS

OF THE MEETING HELD ON 4TH MARCH 1915.

An 'At Home' and Meeting of members and their friends of the Bombay Natural History Society took place in the Society's Rooms on the 4th March 1915.

The election of the following 39 new members since the last Meeting was announced:—Mr. Bernard Triggs, Rutlam; Mr. W. T. Saxton, Ahmedabad; Mr. H. M. Drummond-Hay, Ceylon; Lt. C. M. Ingoldby, R.A.M.C., Jullunder; Mr. G. E. Shaw, Mungpoo; Mr. C. D. McIver, Satara; Mr S. C. Mustafi, Cooch Behar; Mr. E. A. Sitzler, Shwegyin; Mr. B. Breslauer Bombay; Mess Secretary, 2nd Q.V.O. Sappers and Miners, Bangalore; Mr. L. F. Hirst, Colombo; Mr. F. C. Lowis, Myitkyina; Mr. F. Goodyear, Bombay; Revd. A. G. Rondano, S.J., Mangalore; The Honorary Secretary, Frere Hall (Municipal) Library, Karachi; Mr. T. Gilbert, Dharwar; Mr. J. Makeig-Jones, Champaran; Mr. H. Unge-Froren, Lohardaga; Mr. H. Montgomery, I.C.S., Shikarpur; Mr. Chas. R. Major, Kawkareik; Mr. H. T. Mayo, B.A., Karachi; Mr. C. A. Phillip, Calcutta; Lt. E. A. Glennie, R.E., Manora, Karachi; Mr. Alfred Hay, Bangalore; Mr. R. Marrs, Bombay; Mr. Nand Kumar Tewari, B.Sc., Lucknow; Mr. P. J. H. Stent, I.C.S., Saugor, C.P.; Mr. M. H. F. Swete, Papun, Burma; Mr. Norman Wilks, Bombay; Mr. R. V. Argyle, Dharwar; The Mess President, 46th Punjabis, Nowshera; Mr. R. R. O'Hara, Henzada; Mr. M. W. Clifford, I.F.S., Dehra Dun; Mr. M. Mahommed Abubakr Khan, Dadon, Aligarh; Mr. G. C. Gooding, Calcutta; Mr. G. C. Shannon, I.C.S., Bijapur; the District Medical Officer, Burma Railway, Insein, Burma; Mr. J. Hezlett, I.C.S.; Mr. K. R. Alling, Bombay.

ELECTION OF THE COMMITTEE.

The following gentlemen were elected as office bearers for the present year:—President, H. E. The Right Hon'ble Lord Willingdon, G.C.I.E.; Vice Presidents—Mr. J. D. Inverarity, B.A., LL. B.; Revd. F. Dreckmann, S.J.; and the Hon'ble Mr. Justice N. C. Macleod; Managing Committee:—Revd. J. Assmuth, S.J.; Mr. T. Bainbrigge Fletcher, F.E.S.; Mr. T. R. Bell, I.F.S.; Mr. C. L. Burns; Mr. E. Comber, F.Z.S.; Lt.-Col. G. H. Evans, C.I.E., F.L.S.; Major W. H. Evans, R.E.; Prof. G. A. Gammie; Mr. F. Hannyngton, I.C.S.; Mr. G. S. Hardy, I.C.S.; Mr. N. B. Kinnear; Lt.-Col. K. R. Kirtikar, I.M.S. (Retd.); Major W. G. Liston, C.I.E., I.M.S.; Mr. F. M. Macwood; Mr. J. McNeill, I.C.S.; Dr. A. Powell; Mr. E. L. Sale, I.C.S.; Mr. R. A. Spence; Lt.-Col. F. Wall, I.M.S., C.M.Z.S.; Mr. John Wallace, C.E.

Honorary Secretary:—Mr. W. S. Millard; Honorary Treasurer:—Mr. L. H. Savile.

The Honorary Secretary acknowledged the following contributions to the Museum since the last meeting:—

Contribution.	Locality.	Donor.
South Indian Marten (*Martes gwatkinsi*).	Coorg	Mr. F. Hannyngton, I. C. S.
Head of Muntjac (*Muntiacus vaginalis*).	Near Karjat ..	Mr. Nash.

Contribution.	Locality.	Donor.
Stump tailed Macque (*Pithecus arctoides*).	N. of Bhamo ..	Mr. F. C. Lowis.
Chinese Tufted Deer ..		
Takin Skins (*Budorcas*) ..		
Golden Cat (*Felis temmincki*)..		
David's Weasel (*Putorius*) .. (Incomplete.)		
Striped Weasel (*Putorius strigidorsus*)	Paletwa, Burma..	Mr. W. S. Thom.
1 Nilgai	Ferrozepore ..	Capt. Lamott.
2 Blackbuck		
1 Chink head (all mounted) ..		
Also horns and skulls of 6 Blackbuck and 7 Chink and 2 young Gavials (mounted.)		
Desert Cat (*Felis ornata*) ..	Karachi	Mr. J. M. S. Culbertson.
Small Indian Civet (*Viverricula malaccensis*).	Malabar Hill ..	Mrs. Sanders Slater.
Trade skins of Shaw's Cat (*Felis shawiana*).	Borders of Ladak and E. Turkistan.	Mr. A. Canning.
Musk Deer (*Moschus moschiferus*)..	Tibet	Mr. C. H. Dracott.
1 Desert Fox (*Vulpes leucopus*)..	Sirsa	Mr. H. Whistler.
1 Jungle Cat (*Felis affinis*) ..		
2 Imperial Sandgrouse (*Pterocles arenarius*).		
3 Young Wild Dogs (*Cuon dukhunensis*) (presented to Victoria Gardens).	Banda, U. P. ..	Mr. G. B. F. Muir, I. C. S.
Large Pig Skull (*Sus cristatus*) and 1 Bat.	Garhwal	Mr. A. E. Osmaston.
4 Sloth Bear Skulls (*Melursus ursinus*) some Butterflies, Moths, Beetles, Snakes, Bats and Birds' Eggs and Nests.	Various	Mr. C. R. S. Pitman.
Golden Cat (*Felis temmincki*) ..	....	Mr. M. R. Leonard.
1 Turnstone (*Arenaria interpres*)..	Manipur	Mr. J. C. Higgins, I. C. S.
1 Young Comb Duck (*Sarcidiornis melanonotus.*)	Dhar, C. I. ..	H. H. The Maharaja.
2 Avocets (*Recurvirostra avocetta*)..	Uran	Mr. A. H. A. Simcox, I. C. S.
Young falcated Teal (*Eunetta falcata*).	Roorkee	Major A. H. Cunningham.
4 Birds	Katha District ..	Mr. C. E. Milner.
3 Tragopans (*Tragopan satyra*)	Sikkim	Mr. C. H. Dracott.
1 Pigeon		
4 Moth Cocoons, sp ? ..		
1 Water Rail (*Rallus aquaticus*) and a number of Butterflies.	Chakrata ..	Major R. W. Burton.

Contribution.	Locality.	Donor.
Raven (*Corvus corax*) and Buzzard (*Buteo ferox*).	Punjab	Mr. A. E. Jones.
Nutcracker skin (*Nucifraga multipunctata*).	Chitral	Capt. R. D. O. Hill.
Wood Owl (*Syrnium indrani*) ..	Ahmednagar ..	Mr. E. A. Doran, C. I. E.
2 Snakes	Ootacamund ..	Mr. A. Descubes.
Cobra swallowing a wolf snake (*Lycodon aulicus*).	Coorg	Mr. F. S. Sprott.
8 Snakes	Castlerock ..	Mr. R. L. Sinclair.
4 Centipedes		
1 Leech		
3 Bats		
6 Frogs	Madras	Dr. J. Henderson.
10 Cockroaches ..		
4 Spiny tailed lizards (*Uromastix hardwickii*) (alive).	Montgomery ..	Mr. E. Holme Purves

MINOR CONTRIBUTIONS.

Messrs. E. Comber, Counsell, N. A. Masani, Carl Meyer, R. J. Boyd, W. S. Millard, H. R. Hume, Dr. Suter, Mr. Cope, Assistant Surgeon Mewand, Mr. A. E. Currie, Mr. N. B. Kinnear, Capt. R. D. O. Hill, Messrs. C. H. Dracott and D. Dewar.

SPECIMENS SENT IN FOR THE MAMMAL SURVEY.

Contribution.	Locality.	Donor.
The Upland Hare (*Lepus hypsidus*), Crab eating Mongoose (*Mungos urva*), Pallas's Cat (*Felis manul*), Golden Cat (*Felis temmincki*), Panda (*Ælurus fulgens*).	Tibet & Sikkim ..	Mr. C. H. Dracott.
2 Jackals (*Canis indicus*) ..	Multan	Major Lindsay Smith.
1 Jackal („ „) ..	Rawalpindi ..	Mr. F. Tod.
1 Hare (*Lepus peguensis*) ..	Taungdwingji ..	Mr. F. C. Purkis.
1 Hare (*Lepus ruficaudatus*) ..	Midnapur Dist. ..	Mr. A. Burrugh.
1 Albino Blackbuck (*Antilope cervicapra*).	Ahmedabad ..	Mr. R. H. Heath.

THE ACCOUNTS FOR 1914.

Mr. L. H. Savile, the Honorary Treasurer, in presenting the accounts for the year ending 31st December 1914, said :—

The opening balance at the beginning of the year was Rs. 2,198-3-10 and the closing balance Rs. 2,394-6-3 shows a profit of Rs. 196-2-5 on the year's working.

The expenditure during the year amounted to Rs. 45,172, which is Rs. 9,488 more than last year, the receipts however are Rs. 45,368, an increase of Rs. 9,605 over 1913. This large increase in the expenditure and receipts is principally due to money paid out on "Snake Books", "Pigeon Books" and "Wood-destroying White Ant pamphlets," the expenditure on which amounted to Rs. 6,752 and the receipts Rs. 9,530 which accounts for a large portion of the increases referred to.

The total amount received in subscriptions including arrears and those paid in advance for 1915-16 and for Life-Membership amounted to Rs.22,403 which is considerably less than the 1913 subscriptions which amounted to Rs. 24,142.

The amount received by entrance fees was Rs. 1,480 which represents 148 new members as against 72 resigned—a nett increase of 76 members.

The amount paid this year on the Journal account was Rs. 20,362. This includes a large number of extra plates which had to be paid for at an enhanced price but which were found to be necessary on account of the demands for extra journals on account of the continually increasing number of members. The value of new plates paid for 1914 but not as yet utilized amounts to Rs. 2,603.

The accounts as above stated show that the Society is in a sound financial position but in order to maintain the valuable work now being carried on it is necessary that the number of members should continue to increase.

MAMMAL SURVEY FUND.

The opening balance of this fund was Rs. 14,848 and the closing balance Rs. 14,860 so that the expenditure and receipts during the year very nearly balanced. During the year Rs. 25,332 was received in donations to which adding interest on investments made the total receipts for the year as Rs. 25,949. The expenditure during the year was Rs. 25,937 or slightly less than last year which is due to three out of our four collectors having temporarily relinquished their posts towards the end of the year in order to go on active service.

On account of the temporary absence of three collectors the work of the Survey will be to a large extent in abeyance but the money collected is all invested and with the interest received will be available to continue the Survey as soon as the war is over.

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